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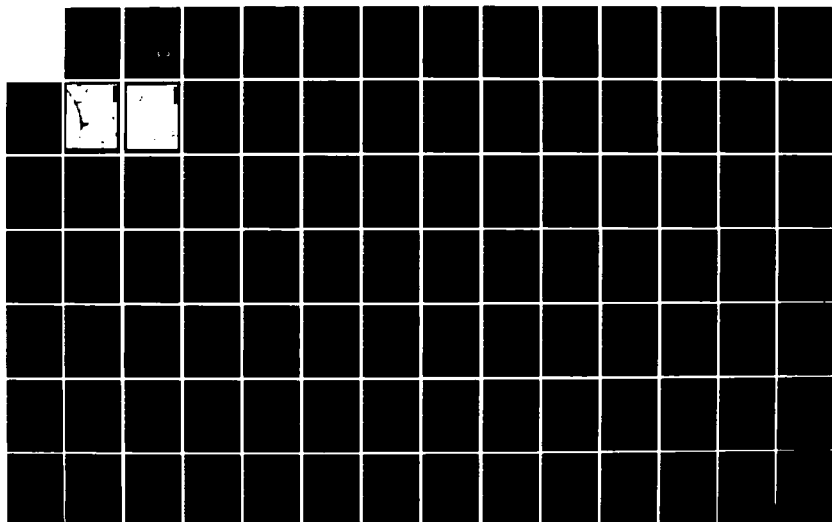
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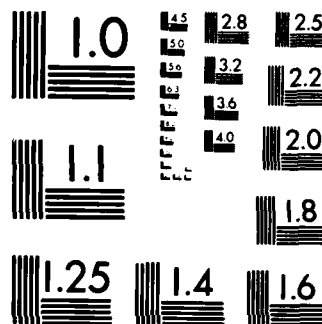
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CONNECTICUT RIVER BASIN
WESTHAMPTON, MASSACHUSETTS

PINE ISLAND LAKE DAM and DIKE
DAM MA 00595
DIKE MA 00596

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is a 25 ft. high, 90 ft. long earth and stone dam with an ungated twin 36 inch pipe spillway and two manually operated drains. The dam was found to be generally in poor condition and the dike to be in fair condition. Indications of seepage were observed at the dam and dike. Both have a size classification of intermediate. The dam hazard potential is high and the dikes is significant. There are various remedial measures that the owner should engage in.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

SEP 21 1971

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the Pine Island Lake Dam & Dike (MA-00595 & MA-00596) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Quality Engineering, and to the owner, Pine Island Lake Recreational Corp., Westhampton, MA. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Quality Engineering for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

Incl
As stated



A-123

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

DAM IDENTIFICATION NO.: MA 00595
DIKE IDENTIFICATION NO.: MA 00596
NAME OF DAM: Pine Island Lake Dam and Dike
TOWN: Westhampton
COUNTY AND STATE: Hampshire County, Massachusetts
STREAM: North Branch Manhan River
DATE OF INSPECTION: July 8, 1981

The dam is a 25 foot high, 90 foot long earth and stone dam with an ungated twin 36 inch pipe spillway and two manually operated drains. There is also a separate 270 foot long, 15 foot high earth and stone dike. Construction of the dam and dike is believed to have occurred in 1920. The dam and dike are owned and operated by the Pine Island Lake Recreational Corporation of Westhampton.

There was no indepth engineering data available for review. Therefore, the adequacy of the project was primarily evaluated by visual inspection, past performance history and sound engineering judgement. The visual inspection indicated the dam to be in generally poor conditon and the dike to be in generally fair condition. Indications of seepage were observed at the dam and dike. Trees were observed near the crest of the dam and on the downstream slope of the dam and dike. The riprap on the upstream face of the dike has experienced sloughing.

The dam and dike have a size classification of intermediate. The dam hazard potential classification is high and the dike is significant. Based upon Corps Guidelines, the test flood would be the full PMF. The test flood inflow would be 2,400 cfs, from the 0.8 square mile drainage area. The routed test flood outflow is 1345 cfs and the corresponding surcharge elevation would be 1003.8. The top of dam and dike, elevation 1002.5, are overtopped by 1.3 feet. The spillway has a capacity of 115+ cfs or 10+ percent of the routed test flood outflow.

It is recommended that the Owner engage a qualified registered professional engineer to investigate and design required remedial measures for: the source of seepage found at the dam and dike; repair of the riprap on the upstream slope of the dike; means of removing trees and roots at the dam and dike and modification of the dam to prevent discharge of water onto the downstream slope. The Owner should also engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic study and evaluate the adequacy of the spillway and the potential for overtopping.

The Owner should institute remedial measures which include: maintenance of brush growth on the slopes; removal of debris from the dam discharge channel and removal of overhanging trees and limbs; replacement of stones missing from the vertical portion of the downstream face of the dike; instituting of an annual technical inspection program and development of a formal warning system for the downstream impact area.

The recommendations and remedial measures should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.



A handwritten signature in cursive script that reads "Ronald H. Cheney". The signature is written in dark ink and is positioned above the printed name and title.

Ronald H. Cheney, P.E.
Vice President

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

This Phase I Inspection Report on Pine Island Lake Dam and Dike (MA-00595 & 00596) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joe W. Finegan

JOSEPH W. FINEGAN, JR. MEMBER
Water Control Branch
Engineering Division

Aramast Mahtesian

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar
JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to

represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Letter of Transmittal	
Brief Assessment	
Review Board Page	
Preface	i
Table of Contents	iii-v
Overview Photo	vi
Location Map	viii

REPORT

1. PROJECT INFORMATION

1.1 General	1
a. Authority	1
b. Purpose	1
1.2 Description of Project	2
a. Location	2
b. Description of Dam and Appurtenances	2
c. Size Classification	4
d. Hazard Classification	5
e. Ownership	5
f. Operator	5
g. Purpose of Dam	5
h. Design and Construction History	5
i. Normal Operational Procedure	6
1.3 Pertinent Data	6

2. ENGINEERING DATA

2.1 Design Data	11
2.2 Construction Data	11
2.3 Operation Data	11
2.4 Evaluation of Data	11

<u>Section</u>	<u>Page</u>
3. VISUAL INSPECTION	
3.1 Findings	13
a. General	13
b. Dam and Dike	13
c. Appurtenant Structures	16
d. Reservoir Area	17
e. Downstream Channel	17
3.2 Evaluation	17
4. OPERATIONAL AND MAINTENANCE PROCEDURES	
4.1 Operational Procedures	19
a. General	19
b. Description	19
4.2 Maintenance Procedures	19
a. General	19
b. Operating Facilities	19
4.3 Evaluation	20
5. EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES	
5.1 General	21
5.2 Design Data	21
5.3 Experience Data	21
5.4 Test Flood Analysis	21
5.5 Dam Failure Analysis	22
6. EVALUATION OF STRUCTURAL STABILITY	
6.1 Visual Observation	25
6.2 Design and Construction Data	25
6.3 Post-Construction Changes	26
6.4 Seismic Stability	26

<u>Section</u>	<u>Page</u>
7. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES	
7.1 Dam Assessment	27
a. Condition	27
b. Adequacy of Information	27
c. Urgency	27
7.2 Recommendations	27
7.3 Remedial Measures	28
a. Operation and Maintenance Procedures	28
7.4 Alternatives	28

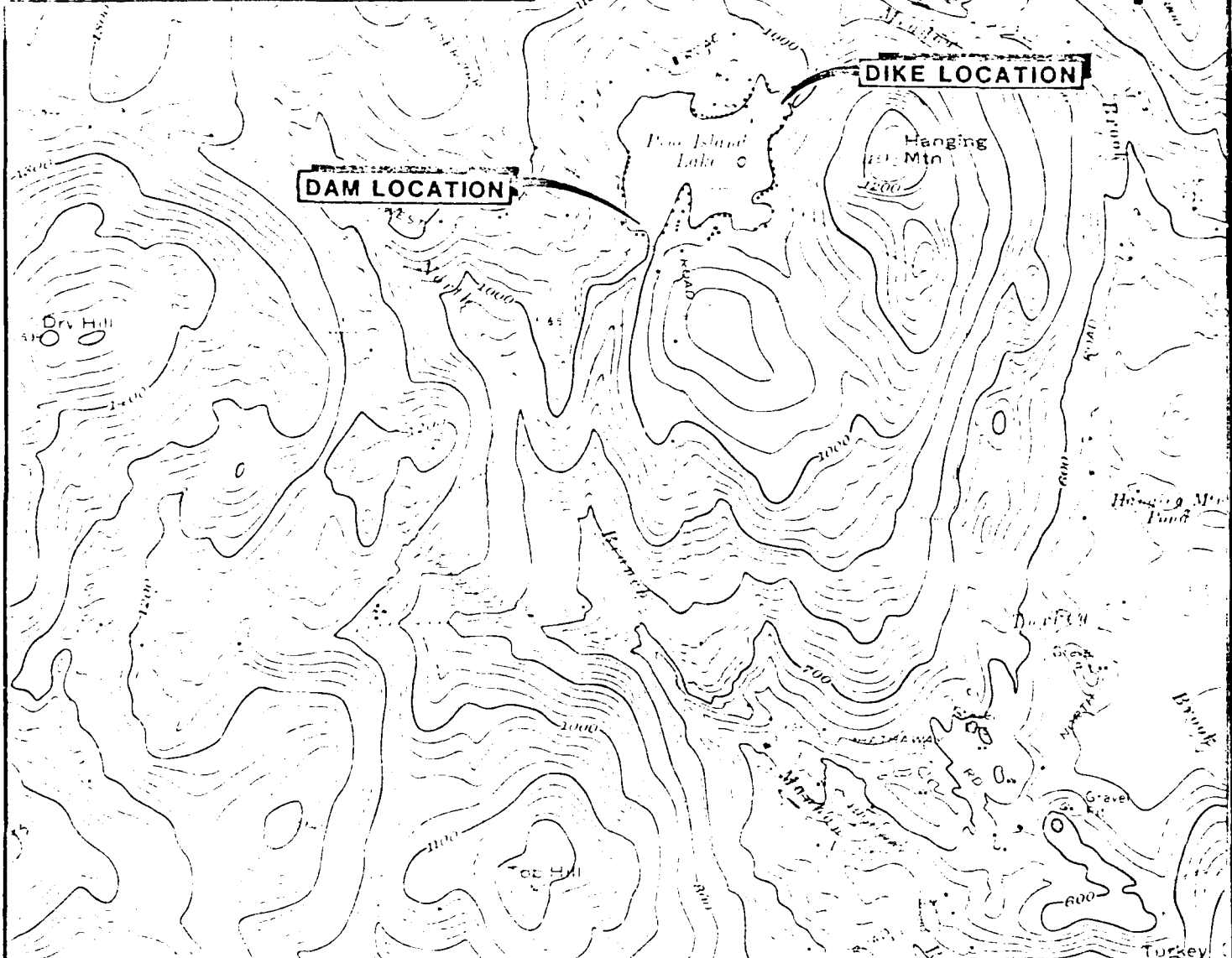
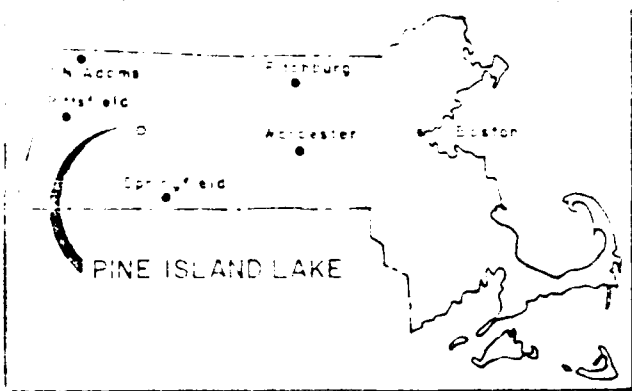
APPENDIXES

APPENDIX A - INSPECTION CHECKLIST	A-1
APPENDIX B - ENGINEERING DATA	B-1
APPENDIX C - PHOTOGRAPHS	C-1
APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS	D-1
APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS	E-1

PINE ISLAND LAKE DAM



PINE ISLAND LAKE DIKE



HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS		U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
PINE ISLAND LAKE DAM & DIKE LOCATION PLAN			
WEST HAMPTON		MASSACHUSETTS	
SCALE 1" = 100'		DATE AUGUST, 1981	

PHASE I
NATIONAL DAM INSPECTION PROGRAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Hayden, Harding & Buchanan, Inc. on 26 June 1981 by William E. Hodgson Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of nonFederal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly, effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Pine Island Lake is located in the Town of Westhampton, Hampshire County, Massachusetts. Pine Island Lake Dam is located on the southwestern shore of the lake, off of Reservoir Road, approximately 900 feet southeast from the Northwest Road - Reservoir Road intersection. Pine Island Lake Dike is located on the northeast shore, 3/4 miles from Reservoir Road on a private road that services cottages on the eastern shore. Pine Island Lake is shown on the Westhampton, Massachusetts U.S.G.S. Quandrangle. The dam has the approximate coordinates of North $42^{\circ} 20' 14''$, West $72^{\circ} 46' 37''$. The dike has the approximate coordinates of North $42^{\circ} 20' 30''$, West $72^{\circ} 46' 15''$. The outlet stream is the North Branch of the Manhan River which flows about 8 miles southeast to meet the Manhan River at Easthampton.

b. Description of Dam and Appurtenances

The dam is a 90+ foot long, 25+ foot high, earth and stone embankment structure with 2 gate structures and two ungated metal, 36 inch diameter pipes which act as a spillway.

The crest of the dam is of irregular shape, approximately 22 feet wide and is paved as shown by photograph 2. The downstream face is comprised primarily of boulder fill inclined at approximately 1 1/2H:1V, (photograph 5). The upstream face is lined with stone and earth with some sections paved with bituminous concrete. It is inclined at about 1 1/2H:1V, (photographs 1 and 2).

There is a spillway structure located at the center of the embankment. It is comprised of a concrete headwall and two, 36 inch diameter ungated corrugated metal pipes, (see photographs 4 and 7). The pipes outlet at the downstream face. The downstream invert is approximately 5 1/2 feet below the crest of dam at about elevation 997.

There are two gate structures located on the upstream face, as shown by photographs 1 and 3. The one nearest to the spillway is a 5 foot square concrete structure which serves as the low level intake. It inlets approximately 23 feet upstream of the gate structure at approximately elevation 982. The gate structure contains a manually operated gate valve which controls a 10 inch intake line. Plans dated August 31, 1970 indicate that approximately 3 feet downstream of the gate structure, the outlet pipe changes to a 21 inch pipe which discharges on the downstream slope. This pipe discharges approximately 21.5 feet below the crest at invert elevation 981.0.

There is a second intake structure located approximately 6 feet to the left of the one described above. This structure serves as the upper level drain. The 24 inch diameter intake for the upper drain is located approximately 6 feet upstream of the gate structure at invert elevation 994. There is a manually operated gate within the structure which regulates flow. The outlet pipe discharges at the downstream slope approximately 10 feet below the crest, at about invert elevation 992.5.

There is a roadway embankment (Reservoir Road) located approximately 20 feet downstream from the toe of the dam. A 5 foot diameter corrugated metal pipe carries spillway outflow below the embankment (photograph 8). The top of the embankment is approximately 6 feet above the crest of the dam.

The dike located on the northeast shore of the lake, is about 2500 feet from the dam. It is approximately 270 feet long, 15 feet high and has a 12 foot wide crest. The upstream face is riprapped to within about 4 feet of the crest. It is turf lined above the riprap and inclined at approximately 2H:1V.

The crest of the dike shown in photograph 12 is grass covered. The elevation at the right abutment is about 1/2 foot lower than the rest of the crest for a length of about 10 feet. This area has been identified as a spillway in previous dam inspection reports.

The downstream face is comprised of a 5+ foot high vertical dry stone masonry wall atop an earth and riprap sloped embankment which is inclined at about 1.25H:1V. There are no outlet works at the dike. The crest of the dike is turf lined (see photographs 9 thru 13).

c. Size Classification

The dam and dike size classification is intermediate based on their heights of 25 feet and 15 feet (respectively) and their storage capacity of 1096 acre-feet. The Corp Guideline for an intermediate size dam is a height of 40 to 100 feet and/or a storage capacity of 1,000 to 50,000 acre-feet.

d. Hazard Classification

The dam has a hazard potential classification of high. Seven homes could be inundated by about 2 to 4 feet of water. Seven roads could be washed out. There is a potential for loss of more than a few lives.

The dike has a hazard potential classification of significant. One structure could be damaged by flood failure. There is a potential for loss of a few lives.

e. Ownership

The dam and dike are owned by the Pine Island Lake Recreational Corporation of Westhampton, Massachusetts.

f. Operator

The dam and dike are maintained and operated by the Pine Island Lake Recreational Corporation. Mrs. Winfred Conway is the President of the Corporation. Her address is 190 Walnut Street, Holyoke, Massachusetts 01040. Her telephone number is (413) 533-7529.

g. Purpose of Dam

The purpose of the dam is recreation.

h. Design and Construction History

The dam is believed to have been built in 1920 by the Loudville Paper Company. In about 1970 the upper level intake was built, the spillway modified and some paving of the crest done. No additional information regarding the design and construction history of the dam was located.

i. Normal Operational Procedures

The upper and lower drains are normally closed. The twin 36 inch spillway pipes are not gated. The level of the reservoir is not normally regulated, however, the reservoir is drained every 5 years and lowered a couple of feet each fall.

1.3 Pertinent Data

a. Drainage Area

The 0.8 s.m. (512 acres) drainage area is rolling, wooded land. There are numerous summer cottages located along the shores of the lake and some development to the west of the dam along Northwest Road. The remainder of the drainage area is basically undeveloped. There are no major drainage paths or swamps located within the drainage area.

b. Discharge at Dam Site

1. Outlet Works

The outlet works at Pine Island Lake Dam consists of two ungated spillway pipes and upper and lower level drains.

The spillway is comprised of two 36 inch diameter corrugated metal pipes and a concrete headwall structure. The pipes inlet on the upstream face at about invert elevation 998 and outlet on the downstream face at about elevation 997.

The lower level drain is comprised of a 10 inch inlet pipe, a manually operated gate structure and a 21 inch outlet pipe. The lower level drain inlets on the

upstream face at about invert elevation 982 and outlets at the downstream face at about invert elevation 981. The capacity of the lower level drain is 5+ cfs with the water level at top of dam, elevation 1002.5.

The upper level drain is comprised of a 24 inch diameter intake pipe, a manually operated gate and a 24 inch outlet pipe. The intake pipe inlets on the upstream face at about invert elevation 994 and outlets at the downstream face at invert elevation 992.5. The capacity of the 24 inch outlet is 55+ cfs with the water level at top of dam, elevation 1002.5.

There are no outlet works at the dike.

2. Maximum Known Flood at Dam Site

There are no records of the maximum flood at the dam. The United States Weather Bureau records indicate that from September 17 to 22, 1938, about 10 to 11 inches of rainfall occurred in this area.

3. Ungated Spillway Capacity at Top of Dam

Under normal operating conditions, the spillway capacity is 95+ cfs with the reservoir water level at the top of dam, elevation 1002.5.

4. Ungated Spillway Capacity at Test Flood Elevation

The test flood spillway discharge would be 115+ cfs. Flow could overtop the dam and dike by 1.3 feet. The test flood surcharge elevation would be 1003.8.

5. Gated Spillway Capacity at Normal Pool Elevation

Not Applicable.

6. Gated Spillway Capacity at Test Flood Elevation
Not Applicable.

7. Total Spillway Capacity at Test Flood Elevation
The test flood spillway discharge would be 115 \pm cfs. Flow could overtop the dam and dike by 1.3 feet. The test flood surge elevation would be 1003.8.

8. Total Project Discharge at Top of Dam
The total project discharge with the reservoir level at the top of dam, elevation 1002.5 and with the 21 and 24 inch drain pipes open is about 125 \pm cfs.

9. Total Project Discharge at Test Flood Elevation
The total project discharge for the test flood condition with the 21 and 24 inch drain pipes closed would be approximately 1345 cfs, at elevation 1003.8.

c. Elevation(feet above NGVD, elevations are approximate)

(1) Streambed at toe of dam -----	977 \pm
(2) Bottom of cutoff -----	Unknown
(3) Maximum tailwater -----	Unknown
(4) Recreation pool -----	998
(5) Full flood control pool -----	N/A
(6) Spillway crest -----	998
(7) Design surge (Original Design) ----	Unknown
(8) Top of Dam -----	1002.5
(9) Test flood surge -----	1003.8

d. Reservoir (Length in feet)

(1) Normal pool -----	2500'
(2) Spillway crest pool -----	2500'

(3)	Top of dam -----	2500'
(4)	Test flood pool -----	2500'
(5)	Flood control pool -----	N/A
e.	<u>Storage (acre-feet)</u>	
(1)	Spillway crest pool -----	835
(2)	Normal pool -----	835
(3)	Top of dam -----	1096
(4)	Test flood pool -----	1175
(5)	Flood control pool -----	N/A
f.	<u>Reservoir Surface (acres)</u>	
(1)	Spillway crest -----	56
(2)	Normal pool -----	56
(3)	Top of dam -----	60
(4)	Test flood pool -----	60
(5)	Flood control pool -----	N/A
g.	<u>Dam and Dike</u>	
(1)	Type ----- stone, masonry, earth	Dam Dike
(2)	Length -----	90' 270'
(3)	Height -----	25' 15'
(4)	Top Width -----	22'+ 12'
(5)	Side Slopes(approx.)-U.S. --- 1-1/2H:1V	2H:1V
	-D.S. --- 1-1/2H:1V	1.25H:1V
(6)	Zoning -----	Unknown for both
(7)	Impervious Core -----	Unknown for both
(8)	Cutoff -----	Unknown for both
(9)	Grout curtain -----	Unknown for both
h.	<u>Diversion and Regulating Tunnel</u> -- none at the project	

i. Spillway

- (1) Type ----- Twin 36" A.C.C.M. outlet pipes
- (2) Length of weir ----- N/A
- (3) Crest elevation ----- 998
- (4) Gates ----- None
- (5) U/S Channel - None ----- opens directly to lake
- (6) D/S Channel ----- riprap downstream face
and riprap channel
- (7) Other ----- outlet channel flows under roadway
embankment 20' d.s. from toe through
5 foot diameter corrugated culvert

j. Regulating Outlets

The upper level drain has a diameter of 24 inches, the lower 10 inches. The intake invert elevation of the upper drain is about elevation 994, and the lower invert is at about elevation 982. The upper drain outlets on the downstream slope at about invert elevation 992.5. The lower drain outlets on the downstream slope at about invert elevation 981.0. The capacity of the upper drain is 25+ cfs with the reservoir level at the top of dam, elevation 1002.5. The capacity of the lower drain is 5+ cfs under these conditions. The upper and lower drains are regulated by manually operated gates. The drains are normally closed. There are no outlets at the dike.

SECTION 2
ENGINEERING DATA

2.1 Design Data

No information was located indicating when or by whom the dam and dike were designed. No design calculations were located. Plans dated 1970, prepared by Anthony Matthew Lipski, P.E., were located, which indicate modifications to the spillway and installation of an upper level drain.

2.2 Construction Data

The dam and dike are believed to have been constructed in 1920. No construction data was located for the dam and dike.

2.3 Operation Data

No operational manual exists for this facility.

2.4 Evaluation of Data

a. Availability

No engineering data was located regarding the dam and dike. Plans dated 1970 indicating modifications to the dam were made available by the Owner. State Inspection Reports for the years 1977, 1975 and 1972, and a County Inspection Report for 1970 were made available at the State Department of Environmental Quality Engineering, Division of Waterways, Boston Office.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore, the adequacy of the dam and dike, structurally and hydraulically, cannot be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history and sound engineering judgment.

c. Validity

The visual inspection of this facility showed no reason to question the validity of the information supplied with the exception of the plan dated 1970, prepared by Anthony Lipski. Scaling from the plan indicates the low level drain to outlet at about 28 feet below the crest. Measurements made in the field indicate the pipe to outlet about 21.5 feet below the crest.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

The dam was inspected on July 8, 1981. A subsequent inspection was performed on July 31, 1981. At the time of the first inspection, the level of the water in the reservoir was at the level of the spillway pipe invert. During the second inspection, the water level was below the spillway invert.

b. Dam and Dike

Dam

The dam is an earth embankment about 25 feet high, 90 feet long, and about 22 feet wide at the crest. The dam dimensions are quite variable with irregular slopes and a non-uniform crest width.

1. Upstream Slope

Above the water surface the upstream face of the dam has a variable slope. Between about the center of the dam and the right abutment, the slope is paved with bituminous concrete, as shown in photograph 1. The left half of the upstream slope, photograph 1 is heavily overgrown with brush. Riprap is present to an elevation about 1 to 2 feet above the spillway crest.

2. Crest

The crest of the dam shown in photograph 2 is covered with bituminous concrete and has an irregular width and elevation. The asphalt is generally in good condition with a few cracks near the spillway headwall. Along the downstream edge of the crest, trees up to 4 inches in diameter are growing.

3. Downstream Slope

The downstream slope is very irregular. Between the spillway pipes and the right abutment, photograph 6, the downstream slope consists of a vertical stone wall founded on bedrock. The center section of the slope, photograph 5, is protected with large rounded stones which act as a splash area for the spillway and outlet pipes. Between this area and the left abutment, the slope is overgrown with brush.

At the time of the July 8, 1981 inspection, water was spilling out of the twin spillway pipes, wetting the entire central section of the downstream slope. Hence, evidence of seepage could not be observed.

On a subsequent site visit on July 31, 1981, the reservoir level was lower and no water was flowing out of the spillway pipes and only a trickle of water was coming out of one of the outlet pipes. Photograph 14 shows the seepage of clear water flowing out of a portion of the toe of the dam on the second site visit. The total flow

seeping through the dam was estimated to be about 175 gpm by measuring the flow channel and flow rate in the pipe downstream of the dam.

Dike

The dike is an earth embankment about 15 feet high, 270 feet long, and 12 feet wide at the crest.

1. Upstream Slope

The upstream face of the dike, photograph 9, has a slope above the reservoir level of about 2H:1V. Riprap is present at the reservoir level but has experienced some deterioration and minor sloughing of the slope has occurred in some areas. Small brush covers most of the slope.

2. Crest

The crest of the dike shown in photograph 12 is grass covered and generally well maintained. The elevation of the crest at the right abutment is about 1/2 foot lower than the rest of the crest for a length of about 10 feet. This area has been identified as a spillway in previous dam inspections.

3. Downstream Slope

The downstream face of the dike has an upper section consisting of a vertical masonry wall and a lower section which is sloped at about 1.25H:1V. A portion of this slope is shown in photograph 11. The vertical masonry wall is generally intact except for a section near the left abutment where several stones are missing, photograph 13.

The lower sloped section of the dike is overgrown with brush and trees up to several inches in diameter are present. Numerous large trees up to 14 inches in diameter are growing near the downstream toe.

A spongy area is present about 15 feet downstream of the toe at about the center of the dike. This area is about 15 feet in diameter.

c. Appurtenant Structures

1. Spillway

The spillway at the dam consists of two 36 inch diameter pipes located near the center of the dam.

Water flowing through the spillway pipes discharges on the downstream face of the dam as shown in photograph 5. The splash area is protected with large rounded riprap. The water flows down the downstream slope of the dam until reaching the toe where it enters the discharge channel.

2. Outlet

There are 2 gate structures located at the upstream face of the dam which control the upper and lower drains (photographs 1 and 3). It is reported that both gate structures are operable.

The high level and low level outlet pipes both terminate on the downstream face of the dam above the downstream toe as shown in photograph 5. The splash area and discharge channel are the same as for the spillway.

d. Reservoir Area

There are no indications of instability along the banks of the reservoir in the vicinity of the dam.

e. Downstream Channel

Both the spillway and outlet pipes discharge into a common channel which enters a 5 foot diameter pipe about 20 feet downstream of the toe of the dam. Some debris is present in the channel. The 5 foot diameter pipe carries the flow under Reservoir Road. The elevation of the road surface is about 6 feet above the crest of the dam.

3.2 Evaluation

Based on the visual inspection, the dam appears to be in poor condition and the dike appears to be in fair condition. The inspection disclosed the following items which require attention:

- a. The seepage of about 175 gpm through the dam, if left uncontrolled, could lead to instability of the dam.
- b. The roots of trees near the crest of the dam and on the downstream slope of the dam and dike could provide shortened seepage paths leading to instability of the dam. If these trees are uprooted, they could result in local sloughing and subsequent erosion leading to instability of the dam.
- c. The discharge of water onto the downstream slope of the dam from the spillway and outlet pipes could lead to instability of the downstream slope.

- d. The spongy area 15 feet downstream of the toe of the dike is indicative of seepage through the dike which, if left uncontrolled, could result in internal erosion and instability of the dike.
- e. The riprap on the upstream face of the dike has experienced some minor sloughing. Continued deterioration of the riprap protection could eventually lead to instability of the upstream slope of the dike.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The purpose of the dam is for recreation. The gates at the intake structures are operated and maintained by the caretaker. There are no provisions for flashboards or stoplogs at the spillway.

b. Description of Warning System in Effect

There are no warning systems at this dam.

4.2 Maintenance Procedures

a. General

The dam is maintained by the Pine Island Lake Recreational Corporation. The Corporation regularly allocates funds for dam and dike maintenance. The dam is inspected about every 5 years by the engineering firm of Tighe and Bond, Easthampton, Massachusetts.

b. Operating Facilities

The dam is used for recreation. The reservoir is drained every 5 years and lowered by a couple of feet every year in the fall.

4.3 Evaluation

Some maintenance of the slopes is performed yearly. Major repairs to the dam had been made in about 1970. The Owner should institute a program of annual technical inspection and a downstream warning and evacuation plan.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Pine Island Lake is located in the north central section of the Town of Westhampton. It is approximately 1.7 miles west of the Northampton town line between the Connecticut and Westfield Rivers. Route 66 is located 3 miles to the south. The 0.8 s.m. (507 acres) drainage area is wooded, undeveloped land and is part of the watershed for the Connecticut River. The terrain is rolling with numerous brooks carrying run-off to the Manhan and Mill Rivers which discharge into the Connecticut River.

5.2 Design Data

The dam and dike are believed to have been constructed about 1920 by the Loudville Paper Company. Repairs were made in 1970. Design data was not located.

5.3 Experience Data

There were no records of rainfall or flood stage located for the dam.

5.4 Test Flood Analysis

The dam and dike have a size classification of intermediate. The dam has a high hazard potential classification and the dike has a significant classification. Based on Corps Guidelines, the test flood would be the full PMF. The test flood

inflow (using the Corps Guideline of 3000 cfs/s.m. from drainage areas less than 1 s.m.) from the 0.8 s.m. drainage area is 2,400 cfs. The routed test flood outflow is 1345 cfs at elevation 1003.8. The dam and dike are overtopped by 1.3 feet. Discharge through the two 36 inch spillway pipes is 115 cfs or about 10 percent of the test flood outflow.

The routed outflow for a 1/2 PMF would be 300+ cfs. The spillway passes 95+ cfs or about 33 percent of the 1/2 PMF outflow. A discharge of this magnitude will overtop the dam and dike by at least 0.1 feet, at elevation 1002.6.

5.5 Dam Failure Analysis

Dam

The dam was determined to have a high hazard potential due to the potential loss of more than a few lives from dam failure flooding. Dam failure was assumed to occur with water at the top of the dam, elevation 1002.5. The peak failure discharge of 5,950 cfs for the dam is developed by assuming a break length of 75 feet for the 25 foot high structure.

The outlet channel for the dam runs in a southerly direction to the North Branch of the Manhan River. The Manhan River discharges into the Connecticut River about 12 miles southeast of the lake. It is estimated that seven roads and seven structures will be impacted in the event of a dam failure. The roads are Reservoir Road, King's Highway, a side road off King's Highway 6,000+ feet downstream of the dam, Southampton Road, North Road, Easthampton Road and Stage Road. The first impacted structure

is located approximately 9,000 feet downstream on Southampton Road. It is located on the banks of the Manhan River. The dam failure discharge flooding will be at least 2 feet (above first floor level).

The second impacted structure is located 13,000 feet downstream on Easthampton Road. Flooding at this site will be at least 2 feet.

The five structures in a reach 15,450+ to 16,200+ feet downstream are located along Easthampton Road. The structures could be damaged by 2 to 3+ feet of floodwater (above first floor level). It is also possible that part of Easthampton Road could be inundated at this time.

Just prior to dam failure flooding, there would be base flow flooding from adjacent drainage areas and spillway discharge. However, damage to homes is not apparent.

Dike

The dike was determined to have a significant hazard potential due to the potential for the loss of a few lives due to failure flooding.

The dike was assumed to fail with the water level at the crest, elevation 1002.5. The peak failure discharge of 4,295 cfs is developed by assuming a breach length of 110 feet for the 15 foot high structure. Since the dike has no spillway, there is no base flow flooding condition from spillway discharge.

Within the reach studied (7,000 feet long), one structure, located 4,400+ feet downstream of the dike, could be damaged by failure flooding. The building is located at the confluence of

Roberts Meadow Brook and Brewer Brook and failure flooding could inundate it to a depth of 3+ feet (above first floor level). North Road crosses the discharge channel 7,000 feet downstream of the dike. The culvert size is unknown at this location, but overtopping of the road is likely.

The total drainage area discharging to a point of 8,500 feet downstream of the dike is 3,670 acres or 5.74 square miles. Cumulative flows from moderate storms plus a dam failure will slightly increase the flooding depths at the areas described above.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual inspection indicates the following potential structural problems:

- a. The seepage through the dam of about 175 gpm could lead to internal erosion and failure of the dam.
- b. Areas of erosion or seepage could be created by the uprooting or decaying of trees located on the downstream toe of the dam and dike and on the crest of the dam.
- c. The discharge of water onto the downstream slope of the dam from the spillway and outlet pipes could lead to instability of the downstream slope.
- d. The presence of a spongy area downstream of the toe of the dike is indicative of seepage which could lead to instability of the dike.
- e. The deterioration of the riprap protection on the upstream slope of the dike could lead to erosion and instability of the upstream slope.

6.2 Design and Construction Data

No original design and construction data were made available for the dam or dike.

6.3 Post Construction Changes

The available information indicates that in or about 1970 the twin spillway pipes were replaced and the upper 24 inch drain and gate structure were installed.

The stone fill forming the downstream embankment of the dam appears to be a modification from the original design.

6.4 Seismic Stability

The dam is located within Seismic Zone 2 and in accordance with the recommended Phase I guidelines does not require seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Based on the visual inspection, the dam appears to be in poor condition and the dike appears to be in fair condition.

b. Adequacy of Information

The information available, together with the visual inspection, is adequate for a Phase I level investigation.

c. Urgency

The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations

a. The Owner should engage a qualified registered professional engineer to investigate and design remedial measures for:

1. Seepage through the dam and dike.
2. Repair of the riprap on the upstream slope of the dike.
3. Means of removing trees and roots from the crest and downstream slope of the dam and the downstream slope of the dike and selecting acceptable backfill for the holes created by root removal.

4. Modifications to the dam to prevent discharge of water onto the downstream slope.

b. The Owner should engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic study and evaluate the adequacy of the spillway and overtopping potential.

The Owner should implement all the recommendations of the Engineer.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. Brush growth on the slopes of the dam and dike should be cut as part of routine annual maintenance.
2. The debris in the dam discharge channel should be removed and overhanging trees and limbs removed.
3. The stones missing from the vertical portion of the downstream face of the dike should be replaced.
4. The Owner should institute a program of annual technical inspection.
5. The Owner should develop a formal warning system for downstream areas in case of emergency.

7.4 Alternatives

There are no practical alternatives for these recommendations and remedial measures.

APPENDIX A
INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981*

TIME 3:30 p.m.

WEATHER Sunny - 90°

W.S. ELEV. 998 U.S. DN.S.

PARTY:

- | | |
|--|---|
| 1. <u>Ron Cheney - HHB</u> | 6. <u> </u> |
| 2. <u>Dave Vine - HHB</u> | 7. <u> </u> |
| 3. <u>Mike Angieri - HHB</u> | 8. <u> </u> |
| 4. <u>Karl Dalenberg - GEI</u> | 9. <u> </u> |
| 5. <u> </u> | 10. <u> </u> |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Dam Embankment</u>	<u>R.C., D.V., M.A., K.D.</u>	<u> </u>
2. <u>Dike</u>	<u>R.C., D.V., M.A., K.D.</u>	<u> </u>
3. <u>Outlet Works</u>	<u>R.C., D.V., M.A., K.D.</u>	<u> </u>
4. <u> </u>	<u> </u>	<u> </u>
5. <u> </u>	<u> </u>	<u> </u>
6. <u> </u>	<u> </u>	<u> </u>
7. <u> </u>	<u> </u>	<u> </u>
8. <u> </u>	<u> </u>	<u> </u>
9. <u> </u>	<u> </u>	<u> </u>
10. <u> </u>	<u> </u>	<u> </u>

*Subsequent visit July 31, 1981 by D. LaGatta and K. Dalenberg of Geotechnical Engineers, Inc.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Dam Embankment

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	1002.5
Current Pool Elevation	998
Maximum Impoundment to Date	Unknown
Surface Cracks	Minor cracking of pavement.
Pavement Condition	Minor cracking of pavement.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	Dam crest is not flat - slopes toward reservoir.
Horizontal Alignment	Dam crest has non-uniform width.
Condition at Abutment and at Concrete Structures	Paved at all structures - minor cracking near spillway headwall.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	None.
Sloughing or Erosion of Slopes or Abutments	Downstream slope irregular rock fill and heavy brush.
Rock Slope Protection - Riprap Failures	Random riprap of left half of upstream face - no failures observed.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	None observed - much of downstream slope wet from spillway flow. Hence, any seepage would be difficult to observe.*
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None known.

*July 31, 1981 inspection - water level lower, seepage estimated at 175 gpm.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Dam Embankment

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<p><u>DAM EMBANKMENT (Con't.)</u></p> <p>Vegetation</p>	<ol style="list-style-type: none"> 1. Trees up to 20 in. at right abutment. 2. Three- to four-in. diameter trees on crest. 3. Brush on left half of upstream face. 4. Brush and trees on much of downstream face.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Dam Embankment

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	1002.5
Current Pool Elevation	998
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	No pavement.
Movement or Settlement of Crest	Collapse of few stones of rock wall on downstream side of crest - near left abutment.
Lateral Movement	None observed.
Vertical Alignment	Good.
Horizontal Alignment	Good.
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None observed.
Trespassing on Slopes	None observed.
Sloughing or Erosion of Slopes or Abutments	Minor erosion at waterline on upstream slope.
Rock Slope Protection - Riprap Failures	Riprap present but overgrown with small brush. Evidence of minor sloughing.
Unusual Movement or Cracking at or Near Toes	Heavily overgrown and covered with brush debris. None observed.
Unusual Embankment or Downstream Seepage	Wet area about 15 ft diameter, located 15 ft downstream of dike toe near center of dike.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None.
Vegetation	1. Minor brush on upstream slope. 2. Trees up to 14-in. diameter on downstream slope and at toe.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Dam Embankment

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p>Slope Conditions</p> <p>Bottom Conditions</p> <p>Rock Slides or Falls</p> <p>Log Boom</p> <p>Debris</p> <p>Condition of Concrete Lining</p> <p>Drains or Weep Holes</p> <p>b. Intake Structure</p> <p>Condition of Concrete</p> <p>Stop Logs and Slots</p>	<p>Below water.</p> <p>Below water.</p> <p>Below water.</p> <p>Below Water.</p> <p>Below water.</p> <p>Below water.</p> <p>None observed.</p> <p>Below water.</p> <p>Below water.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Dam Embankment

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p>General Condition</p> <p>Condition of Joints</p> <p>Spalling</p> <p>Visible Reinforcing</p> <p>Rusting or Staining of Concrete</p> <p>Any Seepage or Efflorescence</p> <p>Joint Alignment</p> <p>Unusual Seepage or Leaks in Gate Chamber</p> <p>Cracks</p> <p>Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p>Air Vents</p> <p>Float Wells</p> <p>Crane Hoist</p> <p>Elevator</p> <p>Hydraulic System</p> <p>Service Gates</p> <p>Emergency Gates</p> <p>Lightning Protection System</p> <p>Emergency Power System</p> <p>Wiring and Lighting System</p>	<p>None at this project.</p> <p>Gates manual.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981
 PROJECT FEATURE Outlet Works NAME K. Dalenberg, D. Vine
 DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - TRANSITION AND CONDUIT</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining on Concrete</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Cracking</p> <p>Alignment of Monoliths</p> <p>Alignment of Joints</p> <p>Numbering of Monoliths</p>	<p>None at this project.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Outlet Structure

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>No outlet structure.</p> <p>Outflow discharges through metal pipes on downstream slope.</p> <p>None.</p> <p>Same as spillway channel.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE

DATE July 8, 1981

PROJECT FEATURE Spillway

NAME K. Dalenberg, D. Vine

DISCIPLINE Geotechnical, Structural, Hydraulic

NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good - below water.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	None.
Floor of Approach Channel	Paved - concrete and asphalt near twin spillway pipes.
b. Weir and Training Walls	Spillway is ungated 36" dia. twin pipes and concrete headwall.
General Condition of Concrete	Headwall good.
Rust or Staining	None observed.
Spalling	None observed.
Any Visible Reinforcing	None observed.
Any Seepage or Efflorescence	None observed.
Drain Holes	None observed.
c. Discharge Channel	
General Condition	Overgrown with trees - random rock base.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	Several trees overhanging channel.
Floor of Channel	Random rock fill - some trees in channel.
Other Obstructions	Some debris in channel.
Other Comments	Five-ft diameter pipe downstream of dam toe to which all flow channeled. The road embankment above this pipe is higher than dam crest.

PERIODIC INSPECTION CHECKLIST

PROJECT PINE ISLAND LAKE DAM AND DIKE DATE July 8, 1981
 PROJECT FEATURE Service Bridge NAME K. Dalenberg, D. Vine
 DISCIPLINE Geotechnical, Structural, Hydraulic NAME R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u>	
a. Super Structure	None at this project.
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B
ENGINEERING DATA

List of Engineering Data

1. Plans dated 1970 outlining modifications to the spillway and installation of a new upper level drain were provided by Ms. Winfred Conway, 190 Walnut Street, Holyoke, Massachusetts 01040.
2. State Inspection Reports for the years 1977, 1975 and 1972, and a County Inspection Report for 1970 were made available at the State Department of Environmental Quality Engineering, Division of Waterways Office, 100 Nashua Street, Boston, Massachusetts 02114.

No additional engineering data was located.



2-36" CMP SPILLWAY
INVERT EL 997.0

24" DRAWDOWN
INVERT EL 992.5

21" DRAWDOWN
INVERT EL 981.0

HEAVY BOULDER FILL

CHANNEL BOTTOM
EL 977.5

3'1" CONC SURFACE
INVEST EL 1002.5
(TAKES)

CONC HEADWALL

VALVE HOUSES ON
CRAWDOWN PIPES

24" UPPER INTAKE INVERT EL 994

24" LOWER INTAKE
INVERT EL 982

6'16" x 1' CONCRETE SEALS

15'

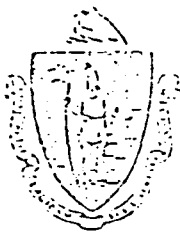
10'

EL 998

JOHN A. HARRIS CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER OFFICERS AND CORPS OF ENGINEERS WALTHAM, MASS.
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NATIONAL PROGRAM OF INSPECTION OF NON-FEED DAMS

PINE ISLAND LAKE DAM & DIKE
PLAN AND SECTION



The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

January 11, 1978

Pine Island Lake Recreational Corp.
Westhampton, Mass.

RE: Insp. Dam #2-6-331-1
Pine Island Lake Dam
Westhampton

Dear Sir:

On April 12, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Pine Island Lake Recreational Corp. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

Brush and bramble should be removed. Small portion of bituminous concrete apron on westerly slope has unraveled-this should be corrected.
Minor seepage around gate seals should be corrected.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

Attn: bjm/

cc: Mr. William Bock
H. Shawway, Dist. #2
F.J. Hoey, DHE

INSPECTION REPORT - DAMS AND RESERVOIRS

1.

LOCATION:

City/Town Westhampton County Hampshire Dam No. 2-2-531-1

Name of Dam Pine Island Lake Dam

Mass. Rect.

Topo Sheet No. 30 Coordinates: N 480,900, E 254,800

Inspected by: Harold T. Shumway, On April 12, 1977 Date 4/12/77 Last Inspection

2.

OWNER/S: As of April 12, 1977

per: Assessors _____, Reg. of Deeds _____, Prev. Insp. X, Per. Contact X

1. Pine Island Lake Recreational Corp., Westhampton, Mass.

Name	St. & No.	City/Town	State	Tel. No.

2. _____

Name	St. & No.	City/Town	State	Tel. No.

3. _____

Name	St. & No.	City/Town	State	Tel. No.

3.

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. William Bostyk, Pres., 16 Dopley St., Hallowell, Mass.

Name	St. & No.	City/Town	State	Tel. No.

4.

DATA:

No. of Pictures Taken None Sketches See description of Dam.
Plans, Where In files of corporation.

5.

DEGREE OF HAZARD: (if dam should fail completely)*

- | | |
|-----------------------------|----------------------|
| 1. Minor _____. | 3. Severe _____. |
| 2. Moderate <u>X</u> _____. | 4. Disastrous _____. |

Comments: Approximately 100 million gallons of water impounded - down to 100 ft. mostly to highway bridges and culverts downstream.

*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Approx. center of dam - twin 36" diam. 100' pipe
spillway.

Controls None, TYPE: _____

Automatic _____. Manual _____. Operative Yes _____. No _____.
 Comments: _____

No. 2 Location and Type: Center of dam - 10" diam. pipe drawdown.

Controls yes, Type: Gate valve

Automatic _____. Manual X. Operative Yes X, No _____.
 Comments: Pipe extended on downstream end with a 21" diam 100' pipe.

No. 3 Location and Type: East of center of dam - 24" diam. pipe drawdown.

Controls yes, Type: Gate valve

Automatic _____. Manual X. Operative Yes X, No _____.
 Comments: _____

Drawdown present Yes X, No _____. Operative Yes X, No _____.
 Comments: See Items Nos. 2 and 3 above.

7. DAM UPSTREAM FACE: Slope 1 1/2:1, Depth Water at Dam 5' to 6'.

Material: Turf X. Brush & Trees _____. Rock fill X. ^{Cons.} Masonry X. Wood _____.
spillway headwall

Other Lease - bituminous concrete apron and concrete floor at intake opening.

Condition: 1. Good _____. 3. Major Repairs _____.
 2. Minor Repairs X. 4. Urgent Repairs _____.
 Comments: A small portion of bituminous concrete apron on west side slope
has unraveled.

8. DAM DOWNSTREAM FACE: Slope 1 1/2:1.

Material: Turf X. Brush & Trees _____. Rock Fill X. Masonry _____. Wood _____.
 Other Massive boulder fill

Condition: 1. Good _____. 3. Major Repairs _____.
 2. Minor Repairs X. 4. Urgent Repairs _____.
 Comments: Minor washable growth on slope - brush at toe of slope - minor
seepage noted.

- 3 -

9. EMERGENCY SPILLWAY: Available was. Needed .

Height Above Normal Water 24 Ft.

Width 30 Ft. Height 14 Ft. Material Bit. conc. surface.

Condition: 1. Good X. 3. Major Repairs .

2. Minor Repairs . 4. Urgent Repairs .

Comments:

10. WATER LEVEL AT TIME OF INSPECTION: 3/4 Ft. Above X. Below .

Top Dam F.L. Principal Spillway X.

Other Invert of twin pipes.

Normal Freeboard 24 Ft. to invert of emergency spillway.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush and bramble growth.

Animal Burrows and Washouts None found

Damage to Slopes or Top of Dam None found

Cracked or Damaged Masonry Area 2 1/2' wide by 5 1/2' long of bituminous concrete unraveled.

Evidence of Seepage Minor seepage around gate seals of overflow pipes.

Evidence of Piping None found

Leaks None found

Erosion None found

Trash and/or Debris Impeding Flow None found

Clogged or Blocked Spillway None found

Other

12.

OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed_____.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list_____.

13.

REMARKS AND RECOMMENDATIONS: (Fully Explain)

This dam appears to be sound and safe with only minor routine maintenance repairs needed.

10/1/60
J-113



The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

January 11, 1978

Pine Island Lake Recreation Corp.
Westhampton, Mass.

RE: Insp. Dam #2-8-331-2
Pine Island Lake Dike
Westhampton

Dear Sir:

On April 12, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Pine Island Lake Recreation Corp. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

Brush growth on upstream slope should be removed. Misplaced stones on downstream wall should be replaced-Path along top of dike should be reseeded. Seepage at toe of downstream slope should be corrected.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

Attn: hja

cc: Mr. William Rosyk
P.J. Hoey, DNE
H. Shumway, Dist. #2

INSPECTION REPORT - DAMS AND RESERVOIRS

LOCATION:

~~Loc~~/Town Westhampton County Hampshire Dam No. 2-8-331-2

Name of Dam Pine Island Lake Dike

Mass. Rect.

Topo Sheet No. 8D Coordinates: N 491,300, E 256,400

Inspected by: Harold T. Shumway, On April 12, 1977 Date 4-18-75 Last Inspection

OWNER/S: As of April 12, 1977

per: Assessors _____, Reg. of Deeds _____, Prev. Insp. X, Per. Contact X

1. Pine Island Lake Recreation Corp., Westhampton, Mass.
Name _____ St. & No. _____ City/Town _____ State _____ Tel. No. _____

2. _____
Name _____ St. & No. _____ City/Town _____ State _____ Tel. No. _____

3. _____
Name _____ St. & No. _____ City/Town _____ State _____ Tel. No. _____

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner; appointed by multi owners.

Mr. William Bosyk,

President of Corporation, 16 Donlee Street, Holyoke, Mass.

Name _____ St. & No. _____ City/Town _____ State _____ Tel. No. _____

DATA:

No. of Pictures Taken None Sketches See description of Dam.
Plans, Where None located

DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor _____ 3. Severe X

2. Moderate _____ 4. Disastrous _____

Comments: Approx. 128 million gallons impoundment-flow would enter Roberts Meadow. Brook-could overtop and/or cause failure of Roberts Meadow Reservoirs-Upper, Middle and Lower Dams Nos. 2-8-214-15, 14 and 16 in Northampton, just above village of Leeds.

* This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: South end of dike-10' to 12'w. x 1/2'h. swale spillway

Controls None, TYPE: _____

Automatic _____. Manual _____. Operative Yes _____. No _____.

Comments: This is an emergency overflow spillway approx. 3 1/2' above normal water level.

No. 2 Location and Type: _____

Controls _____, Type: _____

Automatic _____. Manual _____. Operative Yes _____. No _____.

Comments: _____

No. 3 Location and Type: _____

Controls _____, Type: _____

Automatic _____. Manual _____. Operative Yes _____. No _____.

Comments: _____

Drawdown present Yes X, No _____. Operative Yes _____. No _____.

Comments: See reports on dam No. 2-8-331-1

7. DAM UPSTREAM FACE: Slope 1 1/2:1, Depth Water at Dam 10'±

Material: Turf X. Brush & Trees _____. Rock Fill X. Masonry _____. Wood _____

Other Cobble paved slope

Condition: 1. Good _____, 3. Major Repairs _____.

2. Minor Repairs X, 4. Urgent Repairs _____.

Comments: Minor brush growth along edge upstream slope-minor wear on pedestrian and motor bike path along top of dike.

8. DAM DOWNSTREAM FACE: Slope 1 1/2:1 on rest of slope. Vertical first 4' to 5'

Material: Turf _____. Brush & Trees _____. Rock Fill X. Masonry X. Wood _____

Other Vertical wall of dry stone masonry - 1 1/2:1 slope is stone paved.

Condition: 1. Good _____, 3. Major Repairs _____.

2. Minor Repairs X, 4. Urgent Repairs _____.

Comments: 33' to 35' of northwesterly end of stone masonry wall has deteriorated with most of stones displaced. Minor seepage area at toe of slope.

- 3 -

9. EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water: 3½ Ft.

Width 10' to 12 Ft. Height ½ Ft. Material Earth-swale type _____.

Condition: 1. Good _____.

3. Major Repairs _____.

2. Minor Repairs X.

4. Urgent Repairs _____.

Comments: Sparse turf cover-could erode if overtopped.

10. WATER LEVEL AT TIME OF INSPECTION: 3 Ft. Above _____ Below X.

Top Dam X F.L. Principal Spillway _____.

Other _____

Normal Freeboard 4 Ft. to top of dike.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on upstream slope

Animal Burrows and Washouts None evident

Damage to Slopes or Top of Dam Slight wear evident on path along top of dike

Cracked or Damaged Masonry Several misplaced stones on downstream wall

Evidence of Seepage Minor damp area 15'± from toe downstream slope

Evidence of Piping None found

Leaks None found

Erosion None found

Trash and/or Debris Impeding Flow N/A

Clogged or Blocked Spillway N/A

Other _____

(12.)

OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed_____X_____.
3. Conditionally safe - major repairs needed_____.
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list_____.

(13.)

REMARKS AND RECOMMENDATIONS: (Fully Explain)

This is an earthen embankment 230'± in length, with a cobble paved upstream slope, a turf covered top 10'± wide, and a 1½:1 stone paved downstream slope with a vertical stone masonry wall on the top 4' to 5' of slope. The northwesterly end of this stone masonry wall, approximately 33' to 35' in length, has a great many displaced stones.

A minor growth of brush was noted along the upstream slope.

The seepage area noted in past reports appears to be abating. Only a small area of dampness was noted on this inspection.

May 19, 1975

William Bosyk, President
Pine Island Lake Recreational Corporation
16 Donlee Street
Holyoke, Massachusetts 01040

RE: Inspection-Dam #2-3-331-1 and 2
Westhampton
Pine Island Lake Dam and Dike

Dear Mr. Bosyk:

On April 13, 1975, an engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam and dike. Our records indicate that the Pine Island Lake Recreation Corporation is the owner. Will you please notify this office if this information is not current.

The inspections were made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970 (Dams-Safety Act).

As a result of the inspections, the following information is provided:

Pine Island Lake - Dam #2-3-331-1

The results of the inspection indicate that this dam is safe. The repairs indicated in our letter dated August 21, 1972 have been tended to. The following minor conditions were noted:

1. Remove the light growth of brush and the 6 inch maple from the embankment.
2. There is slight seepage through the 21 and 24 inch diameter sluices which should be checked periodically and corrected when conditions warrant.

Pine Island Lake - Dike #2-3-331-2

The results of the inspection indicate that this dike is safe; however, the following conditions were noted that require attention:

1. Remove the minor growth of brush from the upstream embankment.
2. There are a few missing stones from the top of the masonry wall on the northwesterly end of the dike on the downstream side. Repairs are recommended.

Inspection-Dam
Westhampton
Pine Island Lake Dam and Dike

-2-

May 19, 1975

3. A wet area was observed about 15 ft. from the downstream toe of slope. This appears to be a condition of long standing. Frequent inspection of this area is recommended followed by the necessary corrective action if conditions warrant.

4. Develop a good growth of turf at the emergency spillway swale.

We call these conditions to your attention now, before they become serious and more expensive to correct. With any correspondence, please include the designated numbers above.

Very truly yours,

Norm L. DiGoli

NORMAN L. DIGOLI, P.E.
Acting Deputy Chief Engineer

SLC4
LMD:jmp
cc: F. J. Hoey
E. Salls

INSPECTION REPORT - DAMS AND RESERVOIRS

LOCATION:

City/Town Westhampton County Hampshire Dam No. 2-8-331-1

Name of Dam Pine Island Lake Dam

Topo Sheet No. 8D Mass. Rect. 489,900 Coordinates: N 254,800 E 254,800

Inspected by: Harold T. Shumway On April 18, 1975 Date 3-4-72 Last Inspection

OWNER/S: As of 4-18-75

per: Assessors _____, Reg. of Deeds _____, Prev. Insp. X, Per. Contact X

Pine Island Lake Recreational
1. Corporation, Westhampton, Mass.

Name	St. & No.	City/Town	State	Tel. No.

Name	St. & No.	City/Town	State	Tel. No.

Name	St. & No.	City/Town	State	Tel. No.

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by
absentee owner, appointed by multi owners.

William Bosyk

President of Corp., 16 Donlee St., Holyoke, Mass. 536-0749

Name	St. & No.	City/Town	State	Tel. No.

DATA:

No. of Pictures Taken None Sketches See description of Dam.
Plans, Where In files of corporation.

DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor _____	3. Severe _____
2. Moderate <u>X</u> _____	4. Disastrous _____

Comments: 128 million gallons impoundment - damage would be mostly to highway

bridges and culverts along North Branch of Manhan river.

*This rating may change as land use changes (future development).

⑥. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Approx. center of dam - twin 36' dia. A.C.C.M. pipe spillway.

Controls None, TYPE: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: _____

No. 2 Location and Type: Center of dam - 10" dia. pipe drawdown

Controls Yes, Type: Gate valve

Automatic _____. Manual X. Operative Yes X, No _____.

Comments: _____

No. 3 Location and Type: East of center of dam - 24" dia. pipe drawdown.

Controls Yes, Type: Gate valve

Automatic _____. Manual X. Operative Yes X, No _____.

Comments: _____

Drawdown present Yes X, No _____. Operative Yes X, No _____.

Comments: See item No. 2 and No. 3 above.

⑦. DAM UPSTREAM FACE: Slope 1½:1, Depth Water at Dam 5' to 6'

Material: Turf X. Brush & Trees _____. Rock fill X. Masonry _____. Wood _____

Other Some ledge - also bit. conc. apron

Condition: 1. Good X. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: _____

⑧. DAM DOWNSTREAM FACE: Slope 1½:1

Material: Turf X. Brush & Trees _____. Rock Fill X. Masonry _____. Wood _____

Other Boulder fill

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs X. 4. Urgent Repairs _____.

Comments: Some brush growth on slope, one 6" maple on westerly end of slope
slight seepage noted through 24" dia. and 21" dia. drawdown pipes.

9. EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water: 3 1/2 Ft.

Width 30'± Ft. Height 1'± Ft. Material Bit. conc. surface.

Condition: 1. Good X. 3. Major Repairs _____.
2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: _____

10. WATER LEVEL AT TIME OF INSPECTION: 1/2 Ft. Above X. Below _____.

Top Dam _____ F.L. Principal Spillway X.

Other _____.

Normal Freeboard 3 1/2 Ft. to invert of emergency spillway.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment One 5" maple on westerly end - light brush growth.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None found.

Cracked or Damaged Masonry None found.

Evidence of Seepage Yes - slight seepage noted through 24" dia. and 21" dia. sluices.

Evidence of Piping None evident.

Leaks None evident.

Erosion None evident.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None.

Other _____.

OVERALL CONDITION:

- REMARKS AND RECOMMENDATIONS: (Fully Explain)

The last inspection of this dam on August 4, 1972, showed several needed repairs and dam was classified as condition #3, major repairs needed. Present inspection of April 13, 1975 found evidence that all these needed repairs have been satisfactorily completed. On the westerly end of dam a bituminous cover apron has been put down on the entire upstream slope see enclosed sketch. This, along with other repairs specified in a letter by owners to your Department, dated 11-15-72, seems to have effectively sealed off all leaks noted in previous inspection reports.

No leaks were found anywhere and only a minor seepage was noted coming from outlet ends of 24" dia. and 21" dia. drawdown sluice pipes. This seepage appears to be a normal condition. Some light brush growth was noted on downstream slope. One 6" dia. maple tree was noted growing on westerly end of dam on downstream slope. This tree could become a hazard to dam safety in future years if allowed to continue to grow.

Normal impoundment of this dam is approx. 128 million gallons. Maximum impoundment at point of overtopping would be approx. 192 million gallons.

Dem appears sound and is considered safe at time of inspection.

See also Inspection Report on Pine Island Lake Dike No. 2-2-331-2.

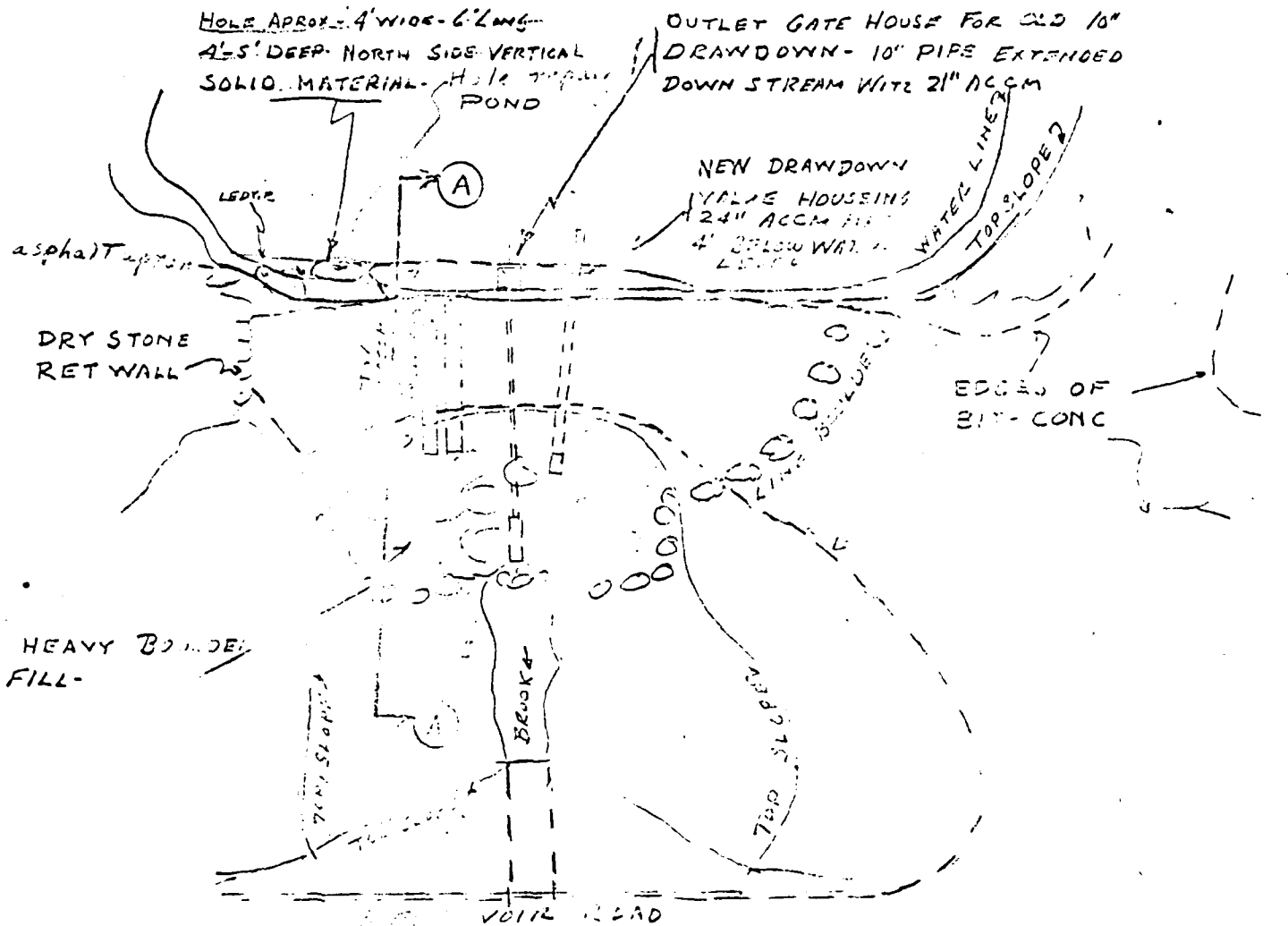
322/13

SKETCHES

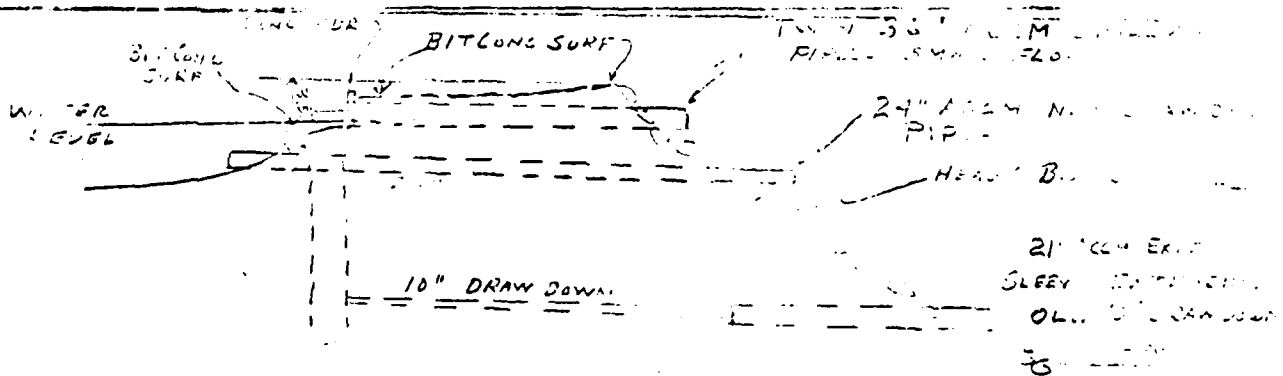
DAM NO. 2-8-331-1

PINE ISLAND LAKE DAM

Aug 4, 1972



PLAN NOT TO SCALE



X SECTION "AA"

NOT TO SCALE

NOT TO SCALE

LOCUS

PLAN

WILLIAMSBURG

Old Wolf Hill

Bascom Hill
1242

Kidd's Lookout

Shaw
Ledges
1212

Bafa Hill

Pine Island
Lake
998

Hanging Mtn
1251

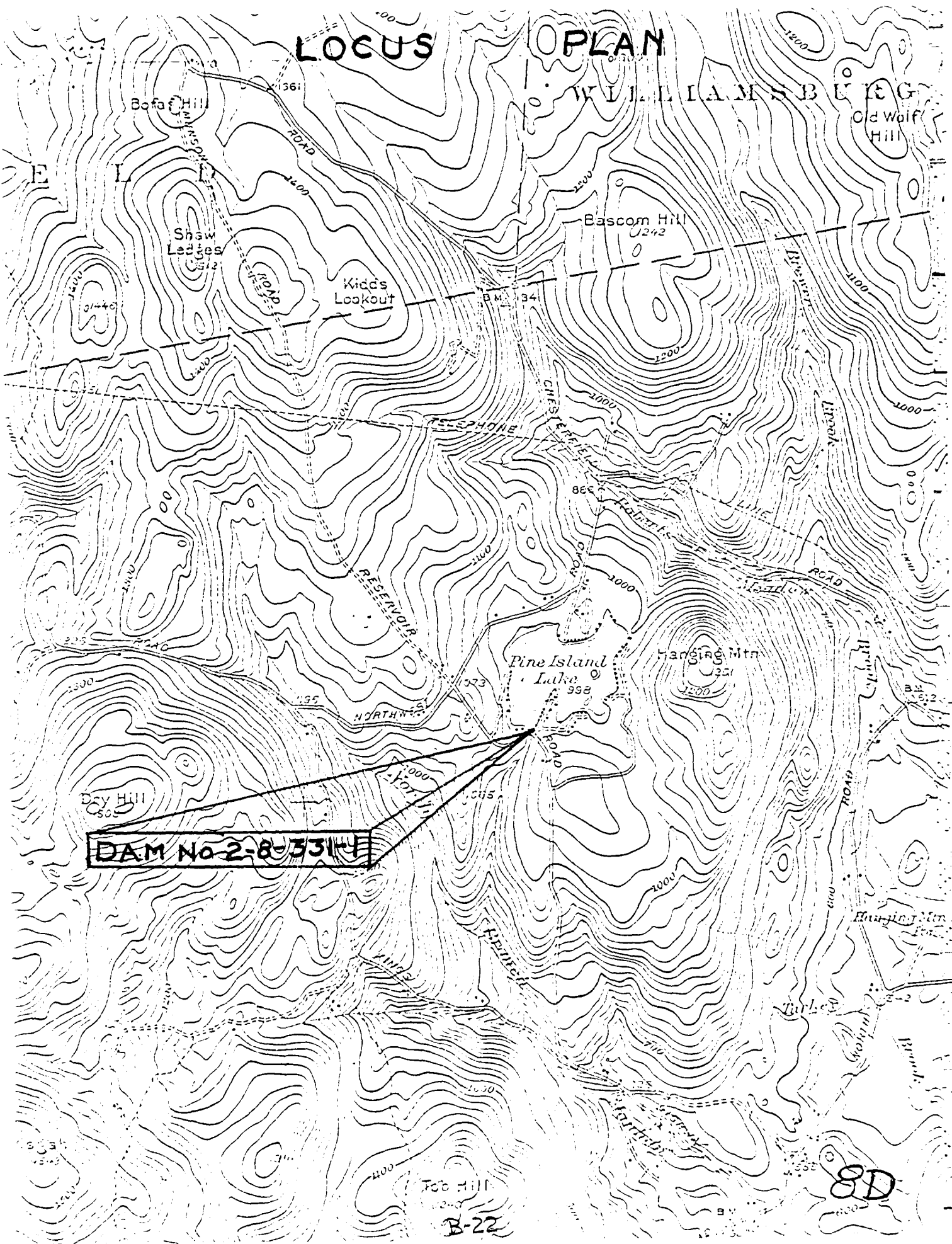
Day Hill
850

DAM No 2-8-331-1

Top Hill

B-22

8D



INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

~~City~~/Town Westhampton County Hampshire Dam No. 2-8-331-2

Name of Dam Pine Island Lake Dike
Mass. Rect.

Topo Sheet No. 8D Coordinates: N 491,300, E 256,400

Inspected by: Harold T. Shumway April 18, Date August 8,
On 1975 Last Inspection 1972

2. OWNER/S: As of April 18, 1975

per: Assessors X, Reg. of Deeds _____, Prev. Insp. X, Per. Contact X

Pine Island Lake
1. Recreation Corporation, Westhampton, Massachusetts 01027
Name St. & No. City/Town State Tel. No.
2. _____
Name St. & No. City/Town State Tel. No.
3. _____
Name St. & No. City/Town State Tel. No.

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by
absentee owner, appointed by multi owners.

Mr. William Bosyk,
President of Corporation, 16 Donlee Street, Holyoke, Ma. 01040 536-0740
Name St. & No. City/Town State Tel. No.

DATA:

No. of Pictures Taken None Sketches See description of Dam.
Plans, Where None Located.

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor _____ 3. Severe X
2. Moderate _____ 4. Disastrous _____

Comments: One hundred twenty-eight (128) million gallons impoundment - would flow into Roberts Meadow Brook, overtopping Roberts Meadow Reservoir, Upper

*This rating may change as land use changes (future development).

Middle and Lower Dams Numbered 2-8-314-15, 14 and 15 in Northampton,
just above Village of Leeds.

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: South end of dike - 10' to 12' W. x 1/2' H. swale
spillway.

Controls None, TYPE: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: This is an emergency overflow spillway approximately 3 1/2'
above normal water level.

No. 2 Location and Type: _____

Controls _____, Type: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: _____

No. 3 Location and Type: _____

Controls _____, Type: _____

Automatic _____. Manual _____. Operative Yes _____, No _____.

Comments: _____

Drawdown present Yes x, No _____. Operative Yes _____, No _____.

Comments: See Reports on Dam Number 2-2-331-2.

7. DAM UPSTREAM FACE: Slope 1 1/2:1, Depth Water at Dam 10'±.

Material: Turf x, Brush & Trees _____, Rock fill x, Masonry _____, Wood _____

Other Cobble paved slope.

Condition: 1. Good x.

3. Major Repairs _____.

2. Minor Repairs _____.

4. Urgent Repairs _____.

Comments: Minor light growth of brush on upstream slope. Foot path along
top of dike slightly eroded from pedestrian traffic.

8. DAM DOWNSTREAM FACE: Slope 1 1/2:1 on rest of slope. Vertical first 4' to 5'

Material: Turf _____, Brush & Trees _____, Rock Fill x, Masonry x, Wood _____
Dry Stone

Other Vertical wall of dry stone masonry - 1 1/2:1 slope stone paved.

Condition: 1. Good _____.

3. Major Repairs _____.

2. Minor Repairs x.

4. Urgent Repairs _____.

Comments: Three or four misplaced stones in retaining wall on northwesterly

- 3 -

9. EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water: 3 $\frac{1}{2}$ Ft.

Width 10' to 12' Ft. Height $\frac{1}{2}$ Ft. Material Earth - swale type.

Condition: 1. Good _____ 3. Major Repairs _____
2. Minor Repairs X 4. Urgent Repairs _____

Comments: Poor turf cover on top or bed of spillway. It appears that some fill
has been placed in spillway since last inspection raising elevation of
invert 6"±.

10. WATER LEVEL AT TIME OF INSPECTION: 4 Ft. Above _____ Below X.

Dike
Top Dam X F.L. Principal Spillway _____

Other _____

Normal Freeboard 4 Ft. to top of dike.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth on upstream slope

Animal Burrows and Washouts None Evident.

Foot path along top of dike shows some wear from
Damage to Slopes or Top of Dam pedestrian traffic.

3 or 4 misplaced stones in top of downstream stone
Cracked or Damaged Masonry masonry retaining wall on northwesterly end.

Evidence of Seepage Yes. Wet area 15'± from toe downstream slope in old brook
bed. No flow noted.

Evidence of Piping None Found.

Leaks None Found.

Erosion None Found.

Trash and/or Debris Impeding Flow N/A

Clogged or Blocked Spillway N/A

Other Swale spillway should have a more adequate turf cover to prevent erosion

(2.)

OVERALL CONDITION:

1. Safe _____.
2. Minor repairs needed X _____.
3. Conditionally safe - major repairs needed _____.
4. Unsafe _____.
5. Reservoir impoundment no longer exists (explain)
Recommend removal from inspection list _____.

(3.)

REMARKS AND RECOMMENDATIONS: (Fully Explain)

This is an earthen embankment about 230'± long with a cobble paved, upstream slope, a turf covered top 10'± wide, and a vertical dry stone masonry wall 4' to 5' high, with a 1½:1 stone paved slope base on downstream slope.

A minor growth of brush was noted on upstream slope which should be cut. Some pedestrian traffic wear on foot path along center of top of dike was noted but this presents no hazard at present. A few misplaced stones were noted on top of stone masonry wall on northwesterly end of dike on downstream side. These should be replaced to prevent any further deterioration of wall and slope.

The seepage area noted in Item 11 appears to be an existing condition of many years. There was no evidence of any water flow or of any fines in area. Future inspections should closely check this area for any increase in size or indication of water flow.

The emergency overflow swale spillway should have a more adequate turf cover developed to prevent possible surface run-off erosion. The elevation of the invert of swale spillway appears to be the same as invert of emergency spillway of Pine Island Lake Dam, Number 2-8-331-1, on opposite end of Lake.

On April 26, 1975 a return visit was made to Pine Island Lake Dam and Dike with Mr. William Bosyk, President of Pine Island Lake Recreational Corporation, at his request. We went over all of conditions needing attention which are mentioned in this Report and in Inspection Report on Dam Number 2-8-331-1. He stated all of these repairs would be done as soon as possible.

Mr. Bosyk also expressed a desire to have any and all correspondence concerning Dams Numbered 2-8-331-1 and 2-8-331-2 sent directly to him. He was assured that this request would be honored by your Department.

This dike appears to be stable and safe at time of inspection

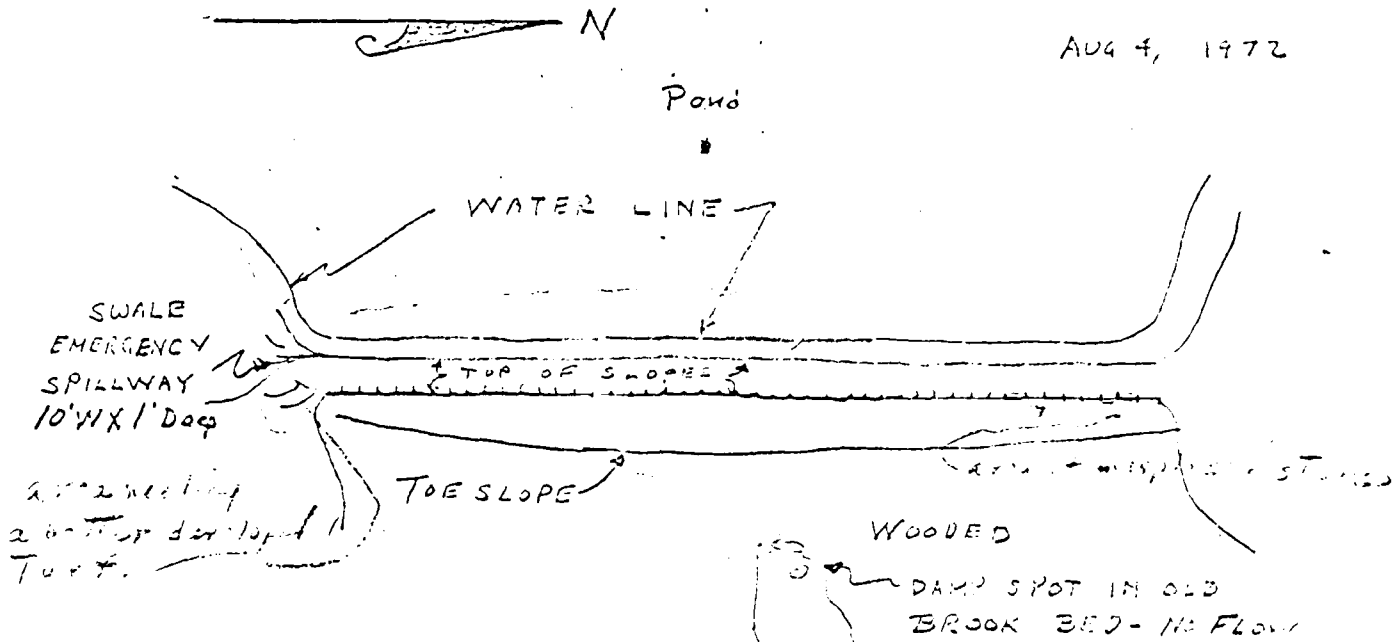
HTS/ed
Enclosure

B-26

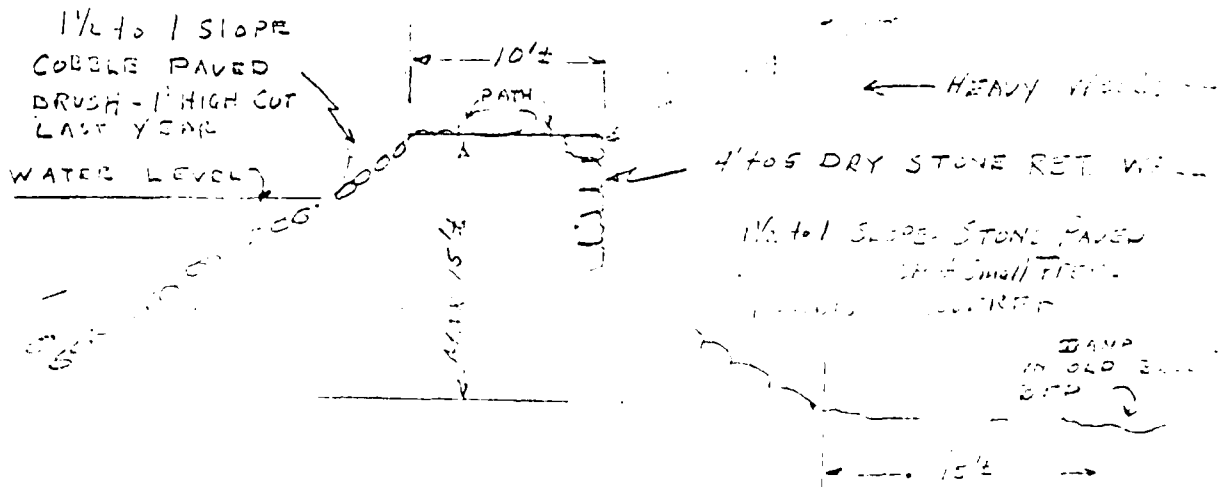
SKETCH

DAM No 2-8-331-2
PINE ISLAND LAKE
DIKE

AUG 4, 1972



PLAN
NOT TO SCALE



X SECTION "AA"

NOT TO SCALE

66 Graves Street
So. Deerfield, Mass. 01373
November 15, 1972

Mr. Malcolm E. Graf, Assoc. Comm.
Division of Waterways
100 Nasnua Street
Boston, Mass. 02114

Re: Inspection of Dam #2-8-331-1
Pine Island Lake
Westhampton, Mass.

Dear Mr. Graf:

We have delayed answering your letter of August 21, 1972 regarding the leak in our dam at Pine Island Lake as we wanted to have something definite to report. It is now possible to do just that.

We lowered the lake about $3\frac{1}{2}$ feet and there is a leak in the earth fill about 15 feet west of the spillway. The blacktop apron, installed a number of years ago, had broken up allowing the water to filter through the fill and run along the ledge on the west side of the dam. This leak seems only to occur when the water level is within $3\frac{1}{2}$ to 4 feet of normal height. The upstream part of the dam below the 4 ft. level seems to hold o.k.

We are in the process of lowering the lake another 2 feet. We will then have the leaky or porous fill removed on the downstream side between what is solid and the rock ledge. Concrete will then be poured to allow it to seep into whatever porous or honeycombed veins might have been caused by the leak. Then the earthen part will be refilled and a new blacktop apron installed up to the rock ledge. This, I am sure, will solve the problem and I hope this meets with your approval.

I had a meeting at the dam yesterday with Mr. Balls of the Northampton Division of your department. Mr. Balls had an associate of his with him and both seemed to be satisfied with our plans, and also with the contractor who will do the work. The work is scheduled to start this weekend and Mr. Balls plans to be on hand periodically to inspect our work and progress.

I did not fill in the form that accompanied your letter as this is only maintenance and repair work and does not constitute an alteration or change in the dam. You also mentioned work done since June, 1970. This work was the result of an order from the County in 1969 to replace our overflow pipes. Both pipes had rusted away on the bottom, allowing the water to run down over the face of the dam. Because of an exceedingly wet fall, we were unable to lower the lake enough to do the work. The County gave us permission to do the work the following year and to lower the lake earlier at their request. This we did and were able to install the new pipes. This also constituted a repair job and not an alteration or change in the dam.

I sincerely hope this all meets with your approval.

DEPARTMENT OF PUBLIC WORKS
REPUTY CHIEF ENGINEER
NORTHAMPTON, MASS.

NOV 21 1972

Very truly yours,

Mark
Mark W. Staggley, Mark
Pine Island Recreation Corp.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 21, 1972

Norman J. Bleakley, Clerk
Pine Island Lake Recreational Corp.
66 Graves Street
South Deerfield, Mass. 01373

Re: Inspection of Dam #2-8-331-1
Westhampton
Pine Island Lake Dam

Dear Mr. Bleakley:

An engineer from the Massachusetts Department of Public Works has inspected the above dam of which the Pine Island Lake Recreational Corp. is the owner.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

It is indicated that extensive work has been done at the dam since June of 1970, if this constitutes an alteration then the enclosed Department application must be completed and returned to this office for review.

The dam in its present condition appears unstable and poses a threat to life and property downstream for which you are responsible.

It is therefore imperative that the pond be drawn down gradually by whatever means possible and maintained at a safe level.

The following deficiencies were noted that require your immediate attention:

1. Locate the source and evaluate the large flow of water thru the stone fill at the downstream base of embankment.

Norman J. Eleakley

August 21, 1972

- 2 -

2. Fill, compact and grade large cavity approximately 10 feet west of the spillway.

It is strongly suggested that you obtain the services of a Registered Professional Civil Engineer experienced in the construction and maintenance of Dams.

An early reply providing a schedule of operations is required. If any further assistance is necessary please contact Mr. Leo Andronico or Mr. John Piaseczny at 727 - 4793. Kindly refer to the number of the dam indicated above.

Very truly yours,

MALCOLM E. GRAF
ASSOCIATE COMMISSIONER

215
LRA:eh

Enclosure:

F. J. Noey Dist. #2
R. Galls Dist. #2

DESCRIPTION OF DAM

DISTRICT 2.

Submitted by Russell C. Salls, P. E.

Dam No. 2-8-331-1

Date August 4, 1972

~~1966~~/Town WESTHAMPTON

Name of Dam Pine Island Lake Dam

1. Location: Topo Sheet No. 8 D Mass. Rect. Coordinates N 489,900 E 254,800
Provide $8\frac{1}{2}$ " x 11" in clear copy of topo map with location of Dam clearly indicated.
At head of a tributary to North Branch Manhan River just northerly of Reservoir Road about 2000 ft. southeasterly from Northwest Road.
2. Year built: Around 1920 by Loudville Paper Co. Year/s of subsequent repairs 1970
3. Purpose of Dam: Water Supply _____ Recreational x
Irrigation _____ Other _____
4. Drainage Area: 3/4 sq. mi. _____ acres.
5. Normal Ponding Area: 56 Acres; Ave. Depth 7 - 8 ft.
Impoundment: 128 million gals; 392 acre ft.
6. No. and type of dwellings located adjacent to pond or reservoir _____
i.e. summer homes etc. 60 summer cottages
7. Dimensions of Dam: Length 100 ft. + Max. Height 25 ft. +
Floodboard 3
Slopes: Upstream Face 1 1/2 to 1
Downstream Face 1 1/2 to 1
Width across top 35 ft. +

8.

Classification of Dam by Material:

Earth X Conc. Masonry _____ Stone Masonry _____
 Timber _____ Rockfill X Other _____

9.

A. Description of present land usage downstream of dam:

100 _____ rural; _____ urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure. yes 1 no X

10.

Risk to life and property in event of complete failure.

No. of people None

No. of homes None

No. of businesses None

No. of industries None Type _____

No. of utilities None Type _____

Railroads None

Other dams On Manhan River

Other 5 or more highway bridges. Damage on North Branch of Manhan River.

11.

Attach Sketch of dam to this form showing section and plan on 8 1/2" x 11" sheet.

RSC/sd/gm

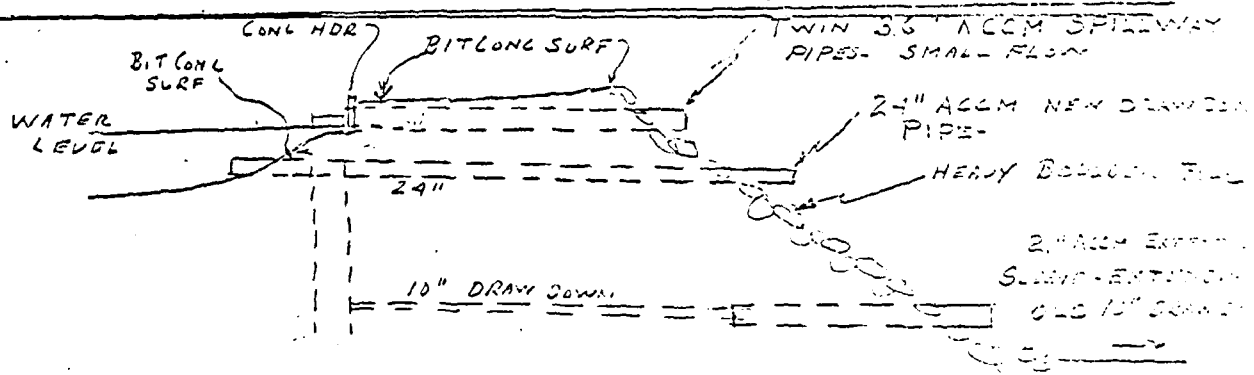
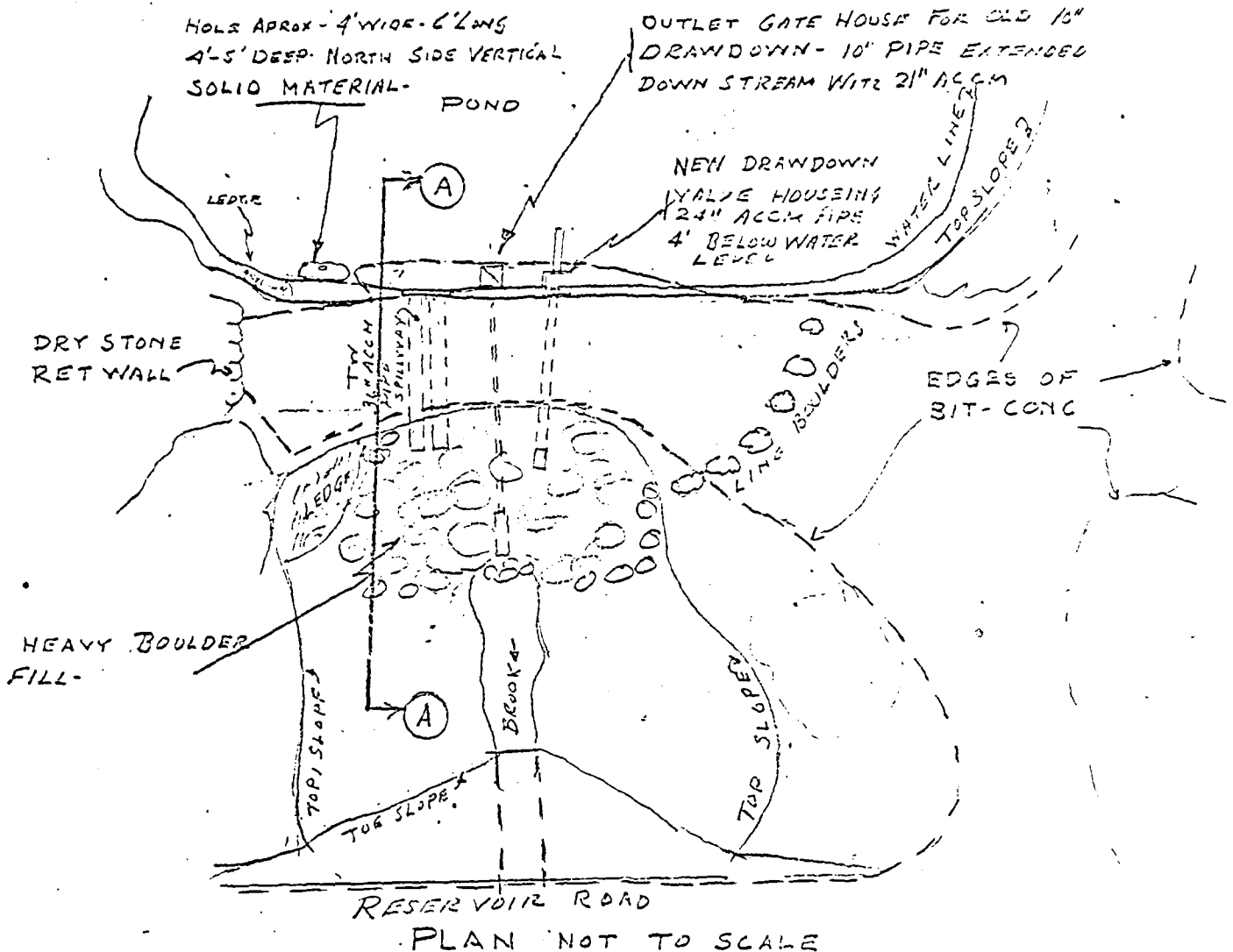
enclos.

SKETCHED

DAM NO. 2-8-331-

PINE ISLAND LAKE DAM

AUG 4, 1972



DAM INSPECTION REPORT

Inspected by Russell C. Salls, Date Aug. 4, 1972
P.E.Date Last Inspection June 1970

Town Westhampton County Hampshire Dam No. 2-8-331-1
 Name of Dam Pine Island Lake Dam USGS ID# 8 D Mass. Rect. 489,900
 Coordinate N E 254,600
 Sketch See Description of Dam Picture Available Plans, Where In Corporation Files
 Owner Representative Notified Date Aug. 1, 1972 By Letter Tel. X
 Owner Representative Mr. Norman J. Bleakley Present Yes X No
 Clerk of Corporation
 Owner Pine Island Lake Recreational Corporation Per Town Assessors As of Aug. 4, 1972
Westhampton, Mass. Reg. of Deeds
c/o Mr. Norman J. Bleakley Previous Insp.
60 Graves Street Personal Contact X
South Deerfield, Mass. 01373

STRUCTURAL DATADAM TYPE: Gravity X Straight X Curved Arched Other DAM MATERIAL: Earth X Conc.Mas. Stone Mas. Steel Timber
 Rock Fill XDAM DIMENSIONS: Length 100⁺ Ft. Height 25⁺ Ft. Widths, Top 35⁺ Ft.
 Unk. Ft.Slope Downstream Face 1½ to 1 Slope Upstream Face 1½ to 1Freeboard Above 3 Ft. Depth Water at Dam 5 - 6 Ft.DAM FACE UPSTREAM: Turf Brush & Trees X Rock Fill X Masonry Wood Other Portion ledge; some turf; bituminous concrete surfaceCondition: 1. Good X 2. Needs Minor Repairs See Comments
 3. Needs Major Repairs
 4. Urgent Needs Repairs for Safety DAM FACE DOWNSTREAM: Turf Brush & Trees Rock Fill X Masonry Wood Other Portion ledge - Mostly heavy boulder fill placed during 1970
Reconstruction and repairCondition: 1. Good X 2. Needs Minor Repairs
 3. Needs Major Repairs
 4. Urgent Needs Repairs for Safety

OUTLETS: Twin 36" spillway just west of center;
Locations 10" drawdown at center; 24" drawdown just east of center.

Spillway - Type Twin 36 inch AACM Pipes Controlled No
Width _____ Height _____ Material AACM Pipes

Emergency Spillway - Available x Needed No
Height above Normal Water 3-4 feet
Width 30 ft. Height 1 ft. Material Bituminous concrete surface
10" diam. pipe-Entry deep in pond. on gravel.
Penstock: Size 24" diam. pipe-Entry 4-5 ft. below water.

Trickle Tube: Size _____

Outlet Controls Available Yes Condition Good Automatic No

Manual Yes Needed No - Valves or gates on both drawdowns.

Drawdown Device: Present Yes Needed _____ Condition Good

Trash Racks, Screens: Present x Condition Screen available for
24" Diam. drawdown. Placed when valve is opened.
Needed _____ No screen for spillway tubes.

AREA DATA

POND: Area 56 Acres Avg. Depth 7 - 8 Ft.

Acre Ft. 392

Water Stored Gals. 128 million gallons

Silted No x Approx. Amount Pond _____

Drainage Area 3/4 Sq. M. TYPE: City, Bus. & Ind. _____

Suburban _____ Rural, Farm _____

Wood & Scrub Land x Slope: Steep _____ Med. x Slight _____

DOWNSTREAM AREA: Valley Character: Narrow x Wide _____

Developed _____ Rural x Urban _____

REMARKS/NOTES:

Brush, Trees and Brush on Embankment No

Gravel, Sand and Silt _____ None found

DEFICIENCIES NOTED (Cont'd.)

-5

Damage to Top or Slope due to Traffic None - Top bituminous concrete.

Cracked or Damaged Masonry None

Evidence of Piping Yes - See note under "Leaks".

Evidence of Seepage Yes - See note under "Leaks".

Erosion No - Dam newly reconstructed in 1970.

Leakage Yes - There is significantly more water flowing out from base and stone filled downstream slope than is passing thru the twin 30" spillway tubes

Missing or Inadequate Trash Screens & Rack Not needed.

Clogged or Blocked Spillways No

Inadequate Spillways No

Trash and/or Rubbish Available to Impede Flow No

Condition Favorable for Injury to Public, i.e., Unprotected Penstock Opening, etc. Deep ravine downstream has very steep sides and rock fill has very rough surface.

Other _____

OVERALL CONDITION: 1. Safe _____ 2. Safe, Minor Repairs Needed _____

3. Conditional Safe, Need Urgent Repairing X 4. Unsafe _____

REMARKS and RECOMMENDATIONS

See attached sheet.

10/24/74

REMARKS AND RECOMMENDATIONS

Since the inspection by the County's Consulting Engineer in June of 1970, considerable work has been done on the dam. A new twin 30 inch AACM pipe spillway and a 24 inch AACM pipe drawdown capable of lowering the water level about 5 feet. have been installed. A heavy boulder fill has been placed on the downstream face with a 21 inch AACM pipe sleeve extending the old 10 inch pipe drawdown thru the fill. The surface of the embankment and much of the upstream face has been surfaced with bituminous concrete shaped so as to drain water into the pond and to serve as an emergency spillway. A line of boulders prevents vehicles from driving on the embankment.

At the time of the inspection only a little water was passing thru the spillway tubes and both drawdowns were closed. There was a much larger flow in the brook immediately below than could be accounted for. Water was flowing out of the base of the stone fill but its exact source could not be determined. A cavity or hole about 4 ft. wide, 6 ft. long and 4 to 5 ft. deep is located about 10 feet west of the spillway just beyond the water line and adjacent to some exposed ledge. Probing with a pole showed that there was a firm vertical surface on the pond side of this hole, but no flow was observed.

Mr. Bleakley, the Clerk of the Corporation, was informed of the above and confirmed my finding. He was concerned over the loss of water and intended to immediately bring it to the attention of the Corporation Directors. He will investigate the hole with scuba diving equipment soon. The Corporation on or about October 12, 1972 intends to drawdown the pond to the level of the new upper drawdown, at which time further investigation of the leak can be made.

The District believes that this condition definitely should be investigated and an expert opinion on the possible effects of this leak on the structure be obtained so that appropriate action can be taken.

August 21, 1972

Norman J. Bleakley, Clerk
Pine Island Lake Recreation Corp.
66 Graves Street
South Deerfield, Mass. 01373

Re: Inspection of Dam #2-8-331-2
Westhampton
Pine Island Lake Dike

Dear Mr. Bleakley:

An engineer from the Massachusetts Department of Public Works has inspected the above dike of which the Pine Island Lake Recreation Corp. is the owner.

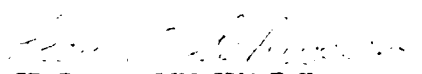
The inspection was conducted under the provisions of Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

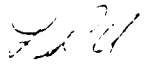
The result of the inspection indicates that no immediate maintenance or repairs are required; however, the following items were noted that will require your attention in the future:

1. Remove brush on upstream slope.
2. Repair small foot path.
3. Remove trees from downstream slope.

We are calling these items to your attention now before they become more serious and expensive to correct.

Very truly yours,


FRED. C. SCHIEDEL P.E.
Deputy Chief Engineer


LHA:ek

cc. Mr. J. J. Coey DCE #2
R. Galls Dist. 2

DAM INSPECTION REPORT

Inspected by R. C. Salls, P.E. Date Aug. 8, 1972Date Last Inspection June 1970

Town Westhampton County Hampshire Dam No. 2-8-331-2
 Name of Dam Pine Island Lake Dike USGS ID# SD Mass. Rect. 491,300
 Coordinate N E 256,400
 Sketch See Description of Dam Picture Available - Plans, Where -
 Owner Representative Notified Date Aug. 4, 1971 By Letter - Tel. X
 Owner Representative Norman J. Bleakley Present Yes X No -
OWNER OF CORPORATION
 Owner Pine Island Lake Recreation Corp. Per Town Assessors - As of 8/4/72
Westhampton, Mass. Reg. of Deeds -
 Previous Insp. -
 Personal Contact X

STRUCTURAL DATADAM TYPE: Gravity - Straight X Curved - Arched - Other -DAM MATERIAL: Earth X Conc. Mas. - Stone Mas. X Steel - Timber -
 Rock Fill - See commentsDAM DIMENSIONS: Length 230⁺ Ft. Height 15⁺ Ft. Widths, Top 10 Ft.
UNK Ft.Slope Downstream Face 4 to 5 vertical, Slope Upstream Face 1 1/2 to 1
 then 1 1/2 to 1Freeboard at 4 Ft. Depth Water at Dam 10 Ft.DAM FACE UPSTREAM: Turf - Brush & Trees - Rock Fill X Masonry -Wood - Other Cobble stone with brush cut last yearCondition: 1. Good X 2. Needs Minor Repairs -
 3. Needs Major Repairs -
 4. Urgent Needs Repairs for Safety -DAM FACE DOWNSTREAM: Turf - Brush & Trees - Rock Fill - Masonry dry stoneWood - Other 4 to 5 ft. Vertical dry stone masonry then 1 1/2 to 1 slope stone
Paved - some brush growing.Condition: 1. Good X 2. Needs Minor Repairs -
 3. Needs Major Repairs -
 4. Urgent Needs Repairs for Safety -

OUTLETS: Locations Emergency spillway; earth at South End Dam. No other outlet.

Spillway - Type - Controlled -

Width - Height - Material -

Emergency Spillway - Available Yes Needed -

Height above Normal Water 3 ft.

Width 10-12 ft. Height 1 ft. Material -

Penstock: Size - Type -

Trickle Tube: Size -

Outlet Controls Available - Condition - Automatic -

Manual - Needed -

Drawdown Device: Present - Needed - Condition -

Trash Racks, Screens: Present - Condition -

Needed -

See report on Dam No. 2-8-331-1

AREA DATA:

POND: Area 56 Acres Avg. Depth 7-8 Ft. 28 ft. max. depth

Acre Ft. 392

Water Ret. Gals. 125 Million

Spill No X Amount Pond -

Flow 3/4 Sq. M. TYPE: City, Bus. & Ind. -

Location - Suburban - Rural, Farm -

Ward & Service X Slope: Steep - Mod. X Shallow -

Drainage AREA: Valley Character: Narrow X Wide -

Development - Rural X Urban -

WATER QUALITY:

Spill Issues and Brush on Embankment No - brush cut last year.

Development None observed.

DEFICIENCIES NOTED (Cont'd.)

-3

Damage to Top or Slope due to Traffic Foot path on top.

Cracked or Damaged Masonry No

Evidence of Piping None found

Evidence of Seepage Wet area 15 ft. ⁺ from toe down stream slope in old brook bed.

Erosion None

Leaks None found

Missing or Inadequate Trash Screens & Rack -

Clogged or Blocked Spillways -

Inadequate Spillways No spillway. See report on Dam No. 2-8-551-1

Trash and/or Rubbish Available to Impede Flow -

Condition Favorable for Injury to Public, i.e., Unprotected Ironstock
Spanning, etc.

Other -

GENERAL COMMENTS: 1. Safe X 2. Safe, Minor Repairs Needed

3. Conditional Safe, More Work to be Done 4. Unsafe

FUTURE AND RECOMMENDATIONS

See attached sheet

1/10/71

744

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
PINE ISLAND LAKE DAM A. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 81

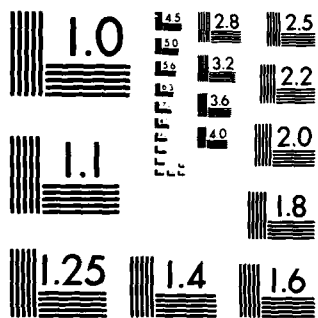
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END

• **et** **non**



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

REMARKS & RECOMMENDATIONS

This structure was found in good condition. The grade of the top is level and the foot path has not caused any wear. The slope on the pond side is paved with cobbles, somewhat overgrown with weeds and brush. There is one small area where a path has been worn to the water's edge. On the downstream slope some rubbish has accumulated and a few small trees have become established on the slope. During the next year, brush on the upstream slope should be cut, the small path repaired, the downstream slope cleaned and the trees cut before they become a problem. At present, this structure appears to be in satisfactory condition and stable.

DD FORM 100-1 (2-60)

NO. 2

Submitted by R. C. Sells, P. E.

Dam No. 2-331-2

Date August 8, 1972

City/Town Westhampton

Name of Dam Pine Island Lake Dam

1. Location: Topo Sheet No. 8 D Mass. Sect. 49 Coordinates N 49° 30' E 246,400

Provide $3\frac{1}{2}$ " x 11" in clear copy of topo map with location of Dam clearly indicated.

3/10 mile from Reservoir Road on private road about 6/10 mile from Northwest Road on northeasterly portion of lake.

2. Year built: Unknown Year/s of subsequent repairs Unknown

3. Purpose of Dam: Water Supply Recreational X
Irrigation Other Former paper mill reservoir.

4. Drainage Area: 3/4 sq. mi. acres.

5. Normal Ponding Area: 56 Acres; Ave. Depth 7-8 ft.
Impoundment: 125 million gals; 392 acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir
i.e. summer homes etc. 50 summer cottages.

7. Dimensions of Dam: Length 230 ft. Max. Height 15 ft.
Crest 4 ft.
Slopes: Upstream Face 1 1/2 to 1
Downstream Face Vertical 4 to 5 ft. then 1 1/2 to 1
Width across top 10 ft.

3.

Classification of Dam by Materials:

Earth X Stone Masonry Stone Masonry X
 Timber RCC Other

4.

a. Distribution of water level above downstream of dam:
 feet ft. ft. ft.

b. Is there a serious type of flood plain in the reach of dam which
 could be damaged by inundation in the event of a complete
 dam failure. Yes No X

5.

Area to life and property in event of complete failure.

No. of people population on downstream side.

No. of homes none

No. of businesses none

No. of industries none Type

No. of utilities electrical Type gas lines

Highways none

Railroad lines none

Other no damage other structures in the reach of dam.

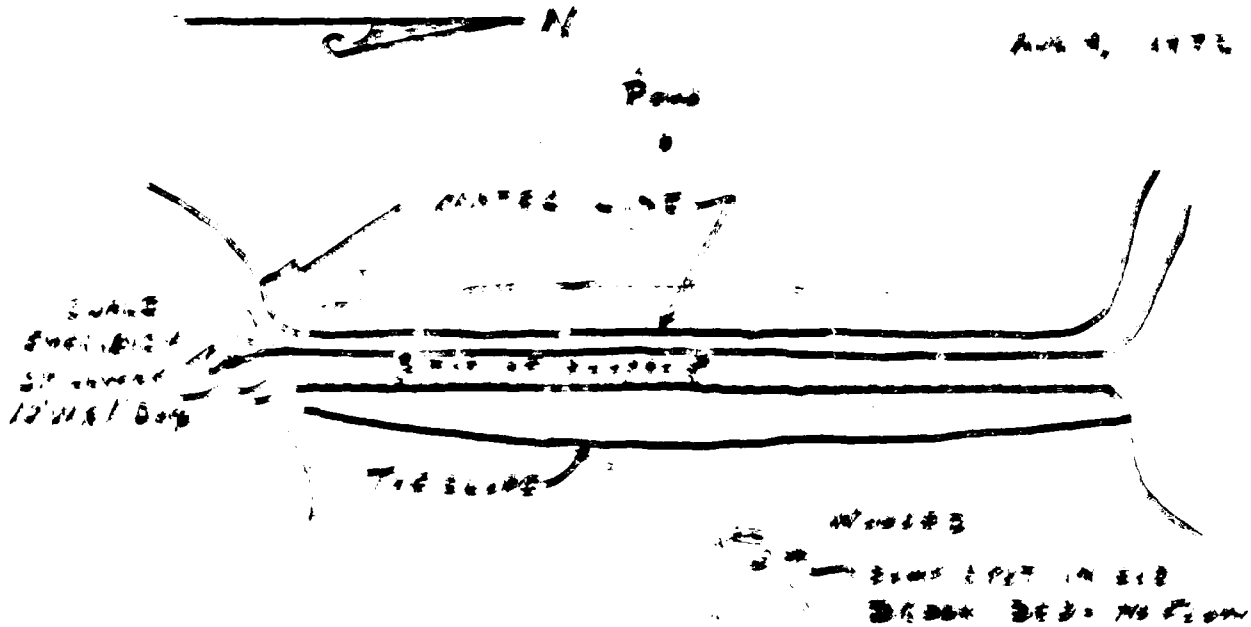
6.

Attach sketch of dam to this form showing section and plan on
 separate sheet.

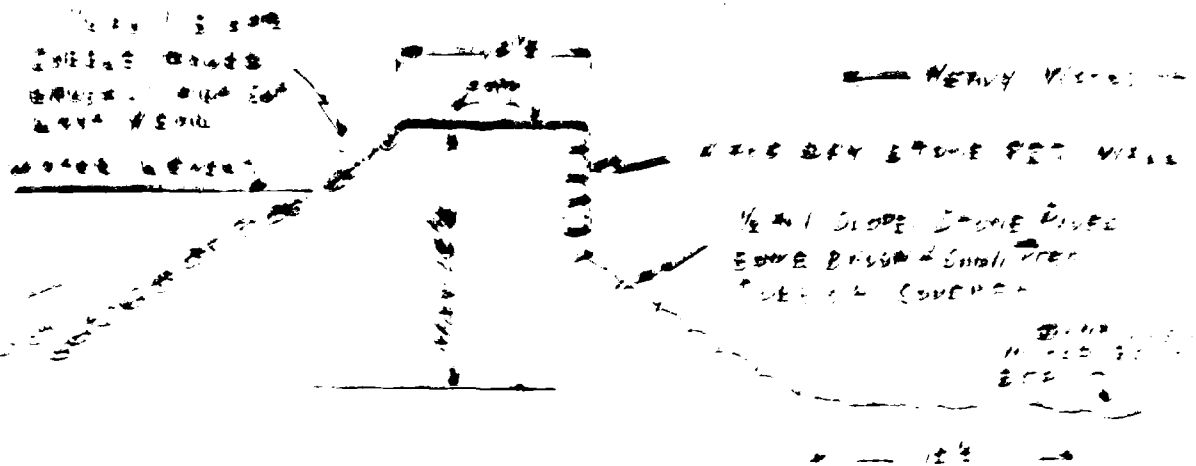
SKETCH

DAM No 2-5-33-2
PINE ISLAND LAKE
DIKE

Aug 4, 1972



PLAN
NOT TO SCALE



CROSS SECTION 'A-A'

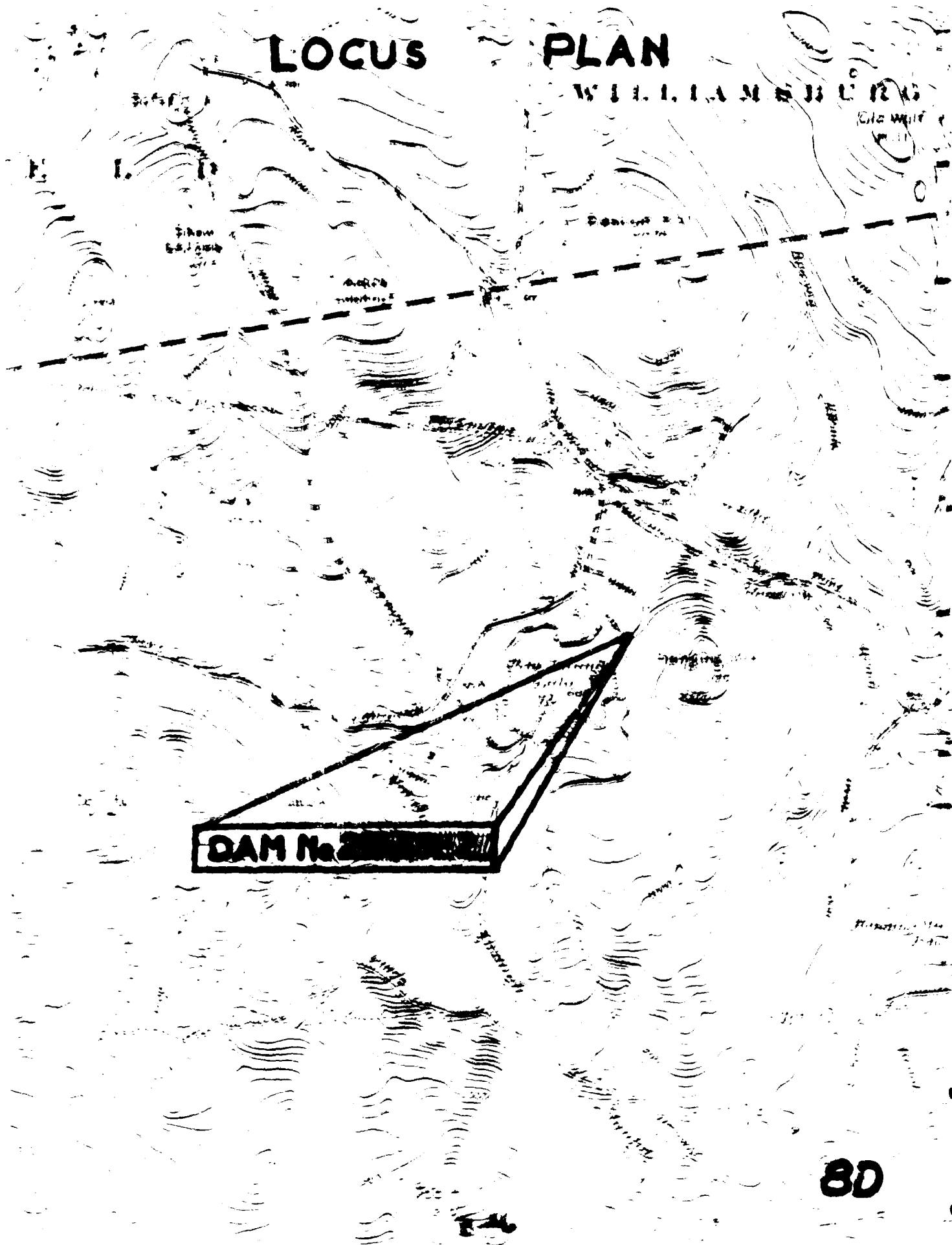
NOT TO SCALE

LOCUS

PLAN

WILLIAMSBURG

CLAWSON



Mr. Nelson Tamm

John T. Simon, Sup. Chief Eng.

November 21, 1930

Re: Our Survey for Plot 42 to connect Pine Island into San Joaquin

I have with Sup. Simon and Mr. Eng. F. May with reference to furnishing an inspector for construction in progress at Pine Island Lake. Mr. Eng. said that at the present time he did not have the personnel to perform this duty or at least anyone that could show what to look for with respect to dams and reservoirs. I then contacted Mr. McDonald of Reno & said he said that he had seen and approved a plan made for repairs to this dam; and that he personally was there at construction site when the water level was down then. He was also present when new gate and spillway pipes were installed. All work would have been completed by this week or at the latest early next week.

Respectfully submitted,

Walter McDonald
Assistant Civil Engineer

WTS

CONFIDENTIAL

CONFIDENTIAL

CONFIDENTIAL

CONFIDENTIAL

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CONFIDENTIAL

MISSISSAUGA POL. DIST. 10

PLATE 1. (continued)

1. 1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2639-2640-2641-2642-2643-2644-2645-2646-2647-2648-2649-2650-2651-2652-2653-2654-2655-2656-2657-2658-2659-2660-2661-2662-2663-2664-2665-2666-2667-2668-2669-2670-2671-2672-2673-2674-2675-2676-2677-2678-2679-2680-2681-2682-2683-2684-2685-2686-2687-2688-2689-2690-2691-2692-2693-2694-2695-2696-2697-2698-2699-2700-2701-2702-2703-2704-2705-2706-2707-2708-2709-2710-2711-2712-2713-2714-2715-2716-2717-2718-2719-2720-2721-2722-2723-2724-2725-2726-2727-2728-2729-2730-2731-2732-2733-2734-2735-2736-2737-2738-2739-2740-2741-2742-2743-2744-2745-2746-2747-2748-2749-2750-2751-2752-2753-2754-2755-2756-2757-2758-2759-2760-2761-2762-2763-2764-2765-2766-2767-2768-2769-2770-2771-2772-2773-2774-2775-2776-2777-2778-2779-2780-2781-2782-2783-2784-2785-2786-2787-2788-2789-2790-2791-2792-2793-2794-2795-2796-2797-2798-2799-2800-2801-2802-2803-2804-2805-2806-280

While this may appear to be a simple matter, it is not. The complexity of the problem is increased by the fact that the government is not a single entity, but a collection of many different agencies, each with its own interests and priorities. This makes it difficult to coordinate efforts and ensure that all agencies are working towards the same goal. Furthermore, the government is often faced with competing interests from different groups, which can make it difficult to reach a consensus on a course of action. Finally, the government is often limited by its resources, which can make it difficult to implement even the most well-planned policies.

THIS COPY OF THIS FORM AND ATTACHMENTS IS TO BE RETURNED TO THE ISSUING OFFICE

1. የግንባታ ስራ፡ በዚህ ዓመት የግንባታ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 2. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 3. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 4. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 5. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 6. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 7. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 8. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 9. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡
 10. የጥበቃ ስራ፡ የጥበቃ ስራ ላይ ትኩረት ማድረግ ይገባል፡፡

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

2. The second step is to gather relevant information and data. This can involve research, consultation with experts, or collecting data from various sources.

3. The third step is to analyze the information and data collected. This involves identifying patterns, trends, and relationships that can help in understanding the problem.

4. The fourth step is to develop a solution or answer. This involves applying the knowledge and skills gained from the previous steps to create a response that addresses the problem.

5. The fifth step is to evaluate the solution or answer. This involves checking the work for accuracy, completeness, and clarity, and making any necessary adjustments.

... ..

[illegible]

lowest standing section of the wall was found to be 10 ft. The top
edge was found to be 10 ft. high.

Below the wall was found the base and the top of the wall
found along the line.

In the opinion of the writer, the base of the wall is
10 ft. high.

Notes on the wall

This section of the wall was found to be 10 ft. high
and the base of the wall was found to be 10 ft. high.

This section of the wall was found to be 10 ft. high
and the base of the wall was found to be 10 ft. high.

This section of the wall was found to be 10 ft. high
and the base of the wall was found to be 10 ft. high.

This section of the wall was found to be 10 ft. high

This section of the wall was found to be 10 ft. high
and the base of the wall was found to be 10 ft. high.

This section of the wall was found to be 10 ft. high
and the base of the wall was found to be 10 ft. high.

Notes on the wall

Notes on the wall

Notes on the wall

APPENDIX C
NOTIFICATIONS

100-17307-2-104

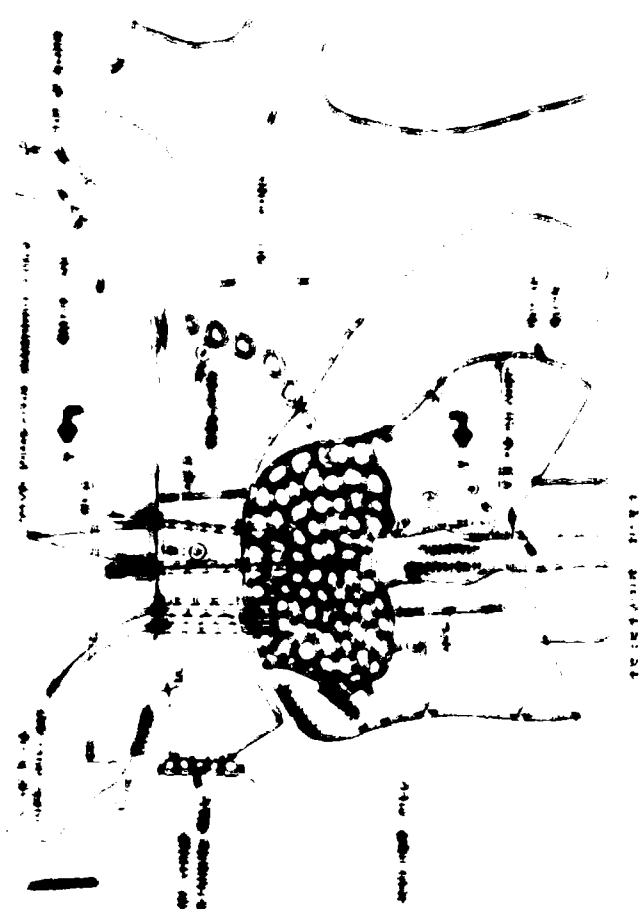




PHOTO NO. 1 - Upstream face of dam.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

PHOTO NO. 3 - Gate structures with reservoir in background.

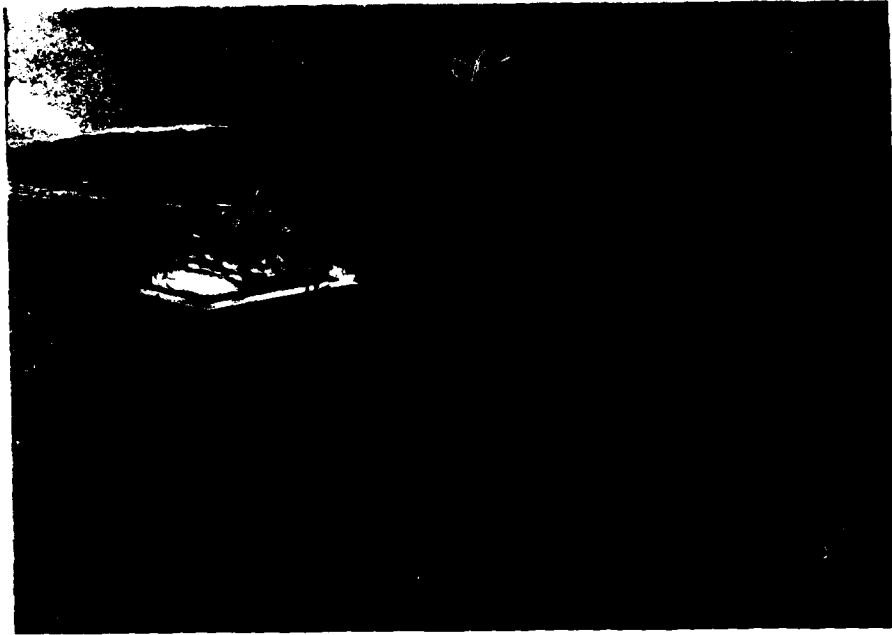


PHOTO NO. 2 - Crest from left abutment.





PHOTO NO. 4 - View of gate structure, spillway pipes and upstream face.



PHOTO NO. 5 - View of downstream slope showing twin spillway pipes and high and low level outlet pipes.



PHOTO NO. 6 - Masonry wall forming downstream side of dam.



PHOTO NO. 7 - Crack in pavement near headwall of twin spillway pipes.



PHOTO NO. 2 - Pipe under road downstream of dam,
looking downstream.



PHOTO NO. 10 - A view of the dark, silhouetted landscape with a bright, irregular shape on the right side.



PHOTO NO. 11 - A view of the dark, silhouetted landscape with two prominent, dark, rectangular shapes in the foreground.



Figure 1 - A photograph of the object taken from the front.



Figure 2 - A photograph of the object taken from the side.



PHOTO NO. 1

2. A photograph of the wall of the room in which the body was found. The wall is covered with a patterned wallpaper. The body is lying on the floor in the lower right corner of the frame.



PHOTO NO. 2

3. A photograph of the wall of the room in which the body was found. The wall is covered with a patterned wallpaper. The body is lying on the floor in the lower right corner of the frame.

20

SECRET

[Faint handwritten notes at the bottom of the page]

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49

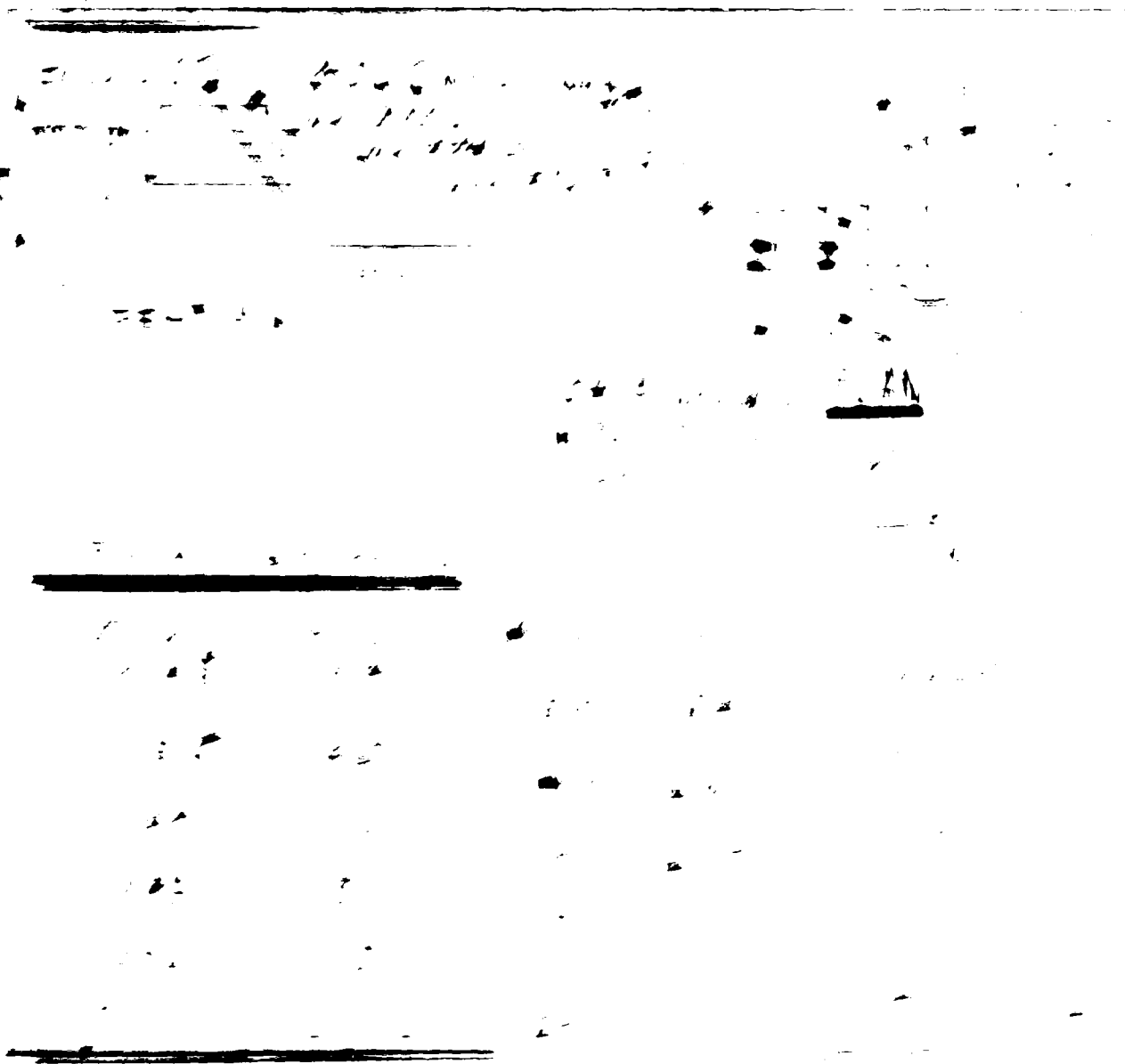
15'

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88

THE NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C. 20540

STANDARD NO.



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26



HAIDEN HARDING & BUCHANAN INC
CONSULTING ENGINEERS
BOSTON - WEST HARTFORD

SHEET NO. 5

JOB _____
SUBJECT _____
CLIENT _____

Test Flood Analysis

1. PMF Inflow, $Q_1 = 2400$ cfs - check

$$D_1 = 1004.3$$

$$V_1 = 375 \text{ a.f. on } 8.79'$$

$$Q_2 = 2400 \left(1 - \frac{8.79}{19}\right) = 1290 \text{ cfs}$$

$$D_2 = 1003.7 \quad V_2 = 337 \text{ a.f. on } 7.9'$$

$$Q_3 = 2400 \left(1 - \frac{8.35}{19}\right) = 1345 \text{ cfs}$$

$$D_3 = 1003.8 \text{ ft}$$

Can & Dike are overtopped by 0.1 ft, cl. 1002.6
Sillway Discharge = 96 cfs or $\frac{1}{3}$ of $\frac{1}{2}$ PMF Outflow

Test Flood Outflow

$$\text{PMF Inflow} = Q_1 = 2400 \text{ cfs}$$

$$D_1 = 1004.3 \quad V_1 = 375 \text{ a.f. on } 8.79'$$

$$Q_2 = 2400 \left(1 - \frac{8.79}{19}\right) = 1290 \text{ cfs}$$

$$D_2 = 1003.7 \quad V_2 = 337 \text{ a.f. on } 7.9'$$

$$V_a = \frac{7.9 + 8.79}{2} = 8.35'$$

$$Q_3 = 2400 \left(1 - \frac{8.35}{19}\right) = 1345 \text{ cfs}$$

$$D_3 = 1003.8 \text{ ft}$$

So far, losses 115 cfs or 10%± of
minus test flood
outflow

Can & Dike are overtopped



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. E-6

JOB 100-100-21
SUBJECT 100-100-21
CLIENT 100-100-21

Dam Failure

$$Q_{F_{\text{Dam}}} = (8/27)(4)(75)(\sqrt{\frac{32.2}{5.5}})(24)^{1.5}$$

$$Q_{F_{\text{D}}} = 5,947 \checkmark$$

Dike Failure $(8/27)(4)(110)(5.67)(\frac{15}{5.5})^{1.5}$

$$Q_{F_{\text{Dike}}} = 4,294 \checkmark$$

Dam : High Hazard, loss of more than
a few lives

Dike : Significant Hazard loss of a
few lives

JOB NO. 711-1011
 DATE 1-1-51
 BY JE
 CH'D BY J. FERRISS



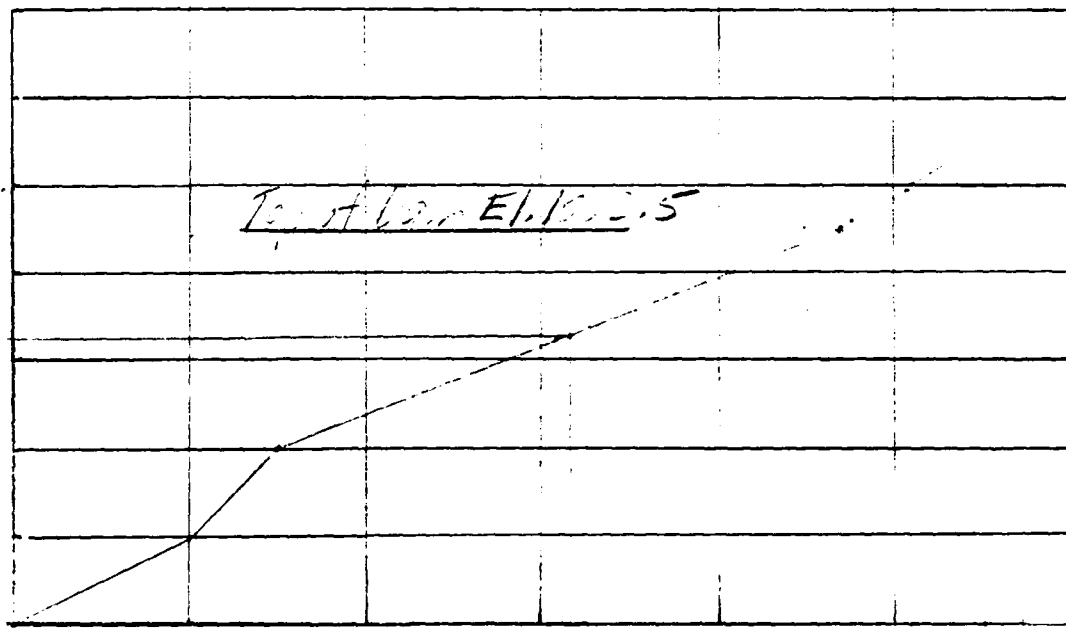
HAYDEN, HARDING & BUCHANAN, INC
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO. 5-7

JOB 1000
 SUBJECT 1000
 CLIENT E

Stage Discharge 2-30" CM Pipe

El. Depth
 1004 6
 1003 5
 1002 4
 1001 3
 1000 2
 999 1
 998 0



Test at El. 1002.5

Spillway Discharge cfs

JOB NO. 732-1
 DATE 21 9 51
 BY FE
 CH'D BY J. FERRISS



HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO. 18
 JOB Dam
 SUBJECT K. S. 2. - 12
 CLIENT C. S.

D. T. 100
 Sp. 431
 1000

EL.

8 1020

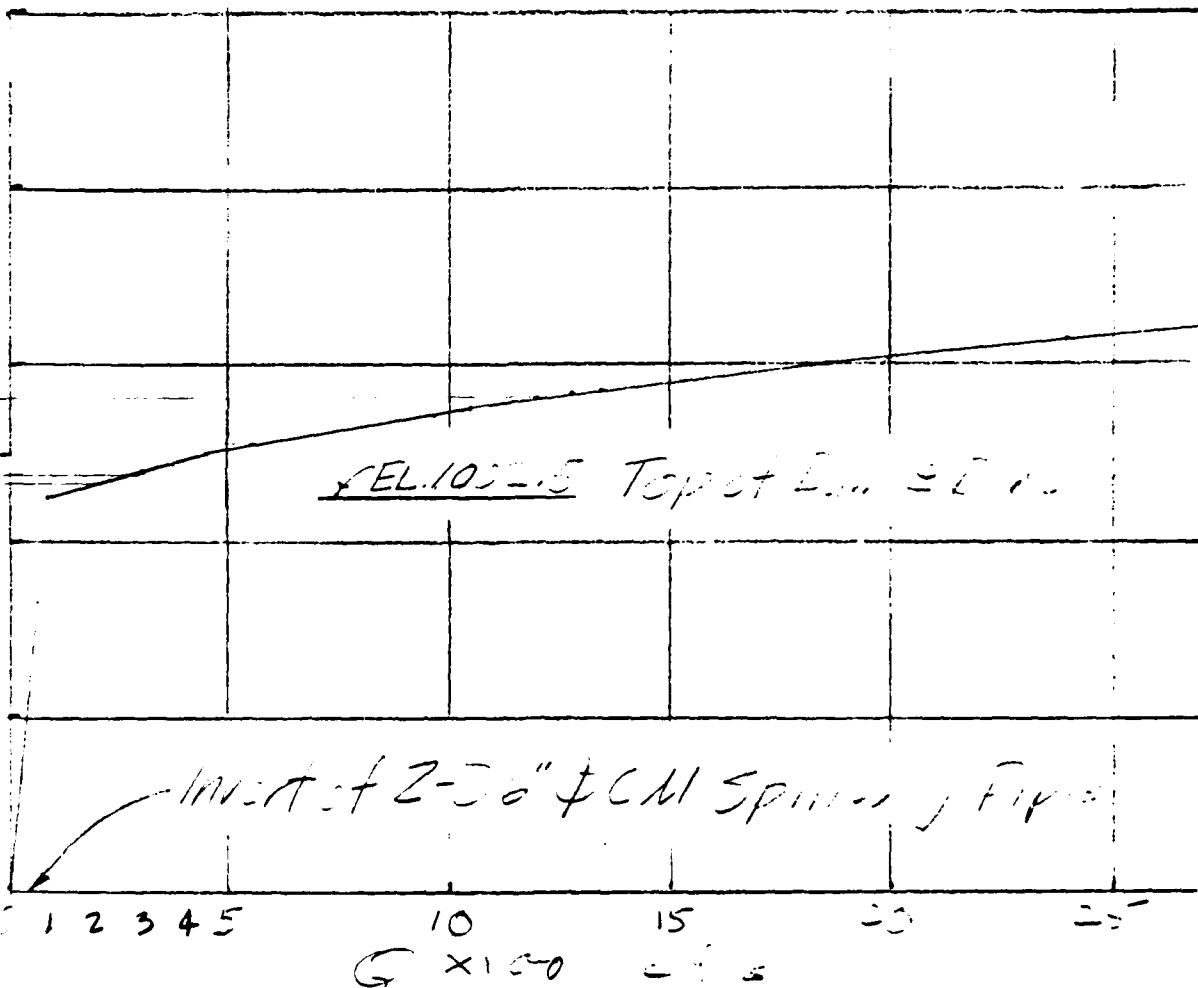
6 1004

1003

4 1002

2 1000

0 998



Combined Discharge - Spillway - Invert - Time

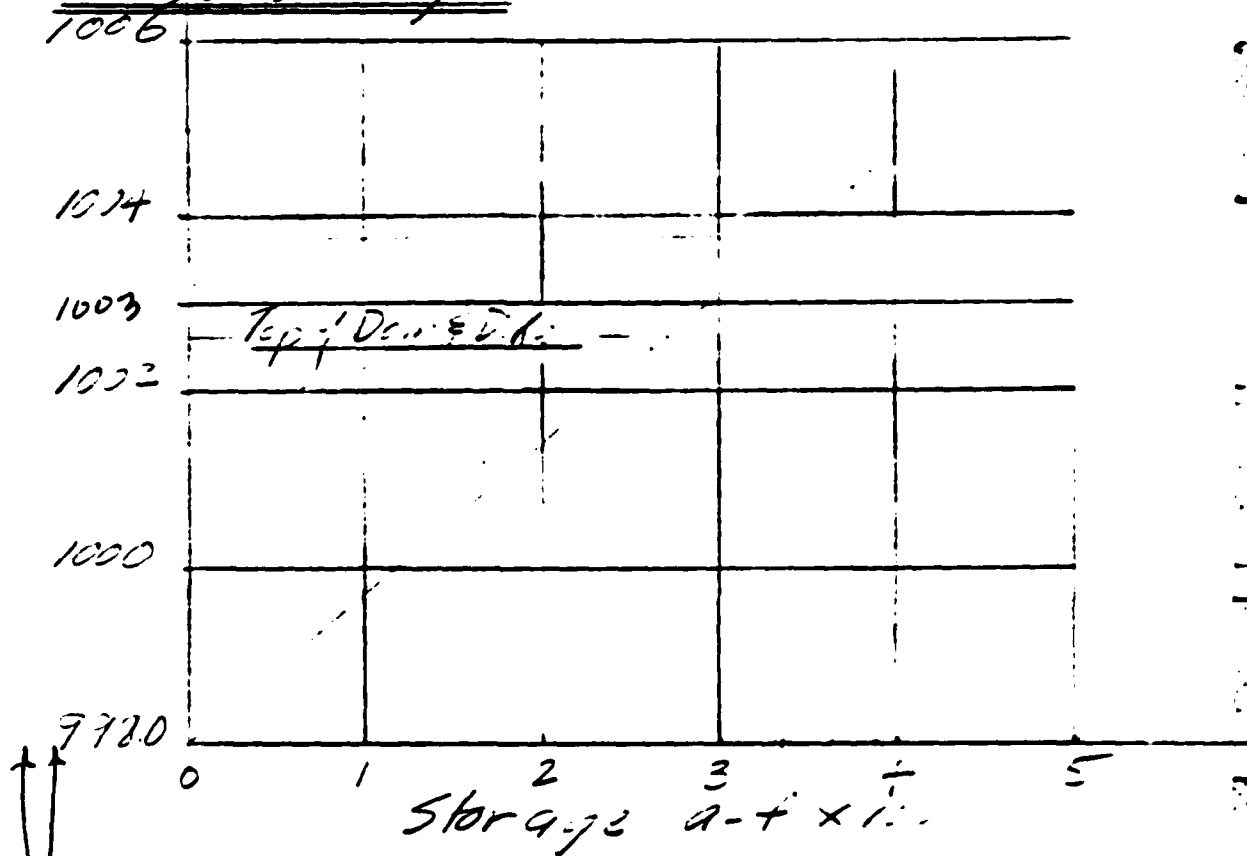
JOB NO. _____
 DATE 7/15/51
 BY JS
 CH'D BY _____



HAYDEN HARDING & BUCHANAN INC
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO. 9
 JOB _____
 SUBJECT _____
 CLIENT _____

Stage Storage



Spillway Elevation 100' and 2'-00" of C.M.P.

Storage at Spillway, $d_p = 7.5$ —

DATE 1/15/55
 BY JS
 CHK BY JS



HAYDEN HARDWARE & BUCHANAN INC
 CONSULTING ENGINEERS
 BOSTON - WEST HARTFORD

SHEET NO 10
 JOB 100
 SUBJECT 100
 CLIENT 100

100 3100 11000 100 100 100 100

54.5

100 3100 11000 100 100 100 100

$$\frac{100}{100} = 1.000 \quad \frac{100}{100} = 1.000$$

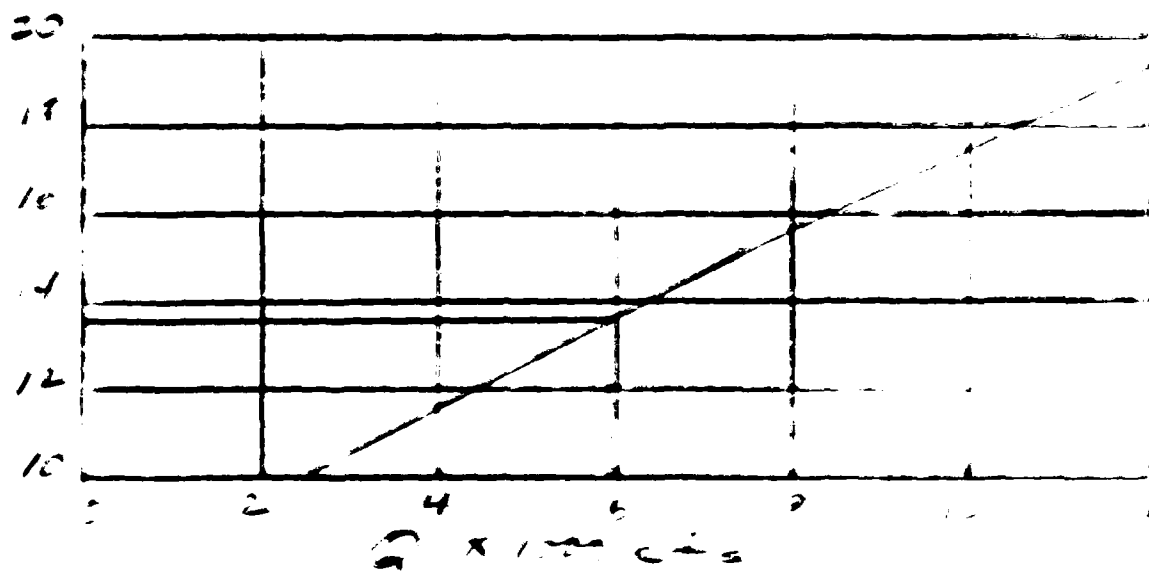
$$\frac{100}{100} \quad 1.000 \quad 1.000 = 1.000$$

100 3100 11000 100 100 100 100

20 10 700 4.25 100 10,700

10 42 210 2.94 123 2,570

15 62 405 3.80 16.1 7,470



$$S_{p1} = 5747, \quad \frac{1}{2} = 3.4 \quad \frac{100}{100} = 1.000$$

$$S_{p2} = 5747 \left(\frac{1.000}{1.000} \right) = 5747$$

$$S_{p3} = 5747 \left(\frac{1.000}{1.000} \right) = 5747$$

$$S_{p4} = 5747 \left(\frac{1.000}{1.000} \right) = 5747$$



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

Form No. 1

100-
100-
100-

5.10.1 3.10.1 3.10.1 3.10.1 3.10.1

1.10.1 1.10.1 1.10.1 1.10.1 1.10.1

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10.9

100 100 100 100 100

88

THE NEW YORK PUBLIC LIBRARY

ASTOR LENOX TILDEN FOUNDATION

1912

THE NEW YORK PUBLIC LIBRARY
ASTOR LENOX TILDEN FOUNDATION
1912

THE NEW YORK PUBLIC LIBRARY
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1912

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ASTOR LENOX TILDEN FOUNDATION
1912

THE NEW YORK PUBLIC LIBRARY
ASTOR LENOX TILDEN FOUNDATION
1912

88

EXAMINE THE FOLLOWING

THESE ARE THE RESULTS OF THE

EXAMINATION

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

100

47.8

2

88

UNITED STATES DEPARTMENT OF AGRICULTURE

WASHINGTON, D. C.

1917

1. The first of the most important factors in the production of food is the soil. The soil must be fertile and well cultivated. The second factor is the seed. The seed must be good and pure. The third factor is the water. The water must be pure and abundant. The fourth factor is the labor. The labor must be well trained and well paid. The fifth factor is the capital. The capital must be well invested and well managed.

2. The second of the most important factors in the production of food is the seed. The seed must be good and pure. The seed must be well protected from disease and insects. The seed must be well stored and well distributed.

3. The third of the most important factors in the production of food is the water. The water must be pure and abundant. The water must be well protected from pollution and waste. The water must be well stored and well distributed.

4. The fourth of the most important factors in the production of food is the labor. The labor must be well trained and well paid. The labor must be well organized and well managed. The labor must be well protected from exploitation and oppression.

5. The fifth of the most important factors in the production of food is the capital. The capital must be well invested and well managed. The capital must be well protected from loss and waste. The capital must be well stored and well distributed.

88

OFFICE OF THE DIRECTOR OF THE
BUREAU OF THE CENSUS
WASHINGTON, D. C.

1910

6

1. The first of the following is the name of the person who is the head of the household.

2. The second of the following is the name of the person who is the head of the household.

3. The third of the following is the name of the person who is the head of the household.

4. The fourth of the following is the name of the person who is the head of the household.

5. The fifth of the following is the name of the person who is the head of the household.

6. The sixth of the following is the name of the person who is the head of the household.

7. The seventh of the following is the name of the person who is the head of the household.

8. The eighth of the following is the name of the person who is the head of the household.

9. The ninth of the following is the name of the person who is the head of the household.

10. The tenth of the following is the name of the person who is the head of the household.

11. The eleventh of the following is the name of the person who is the head of the household.

12. The twelfth of the following is the name of the person who is the head of the household.

13. The thirteenth of the following is the name of the person who is the head of the household.

14. The fourteenth of the following is the name of the person who is the head of the household.

15. The fifteenth of the following is the name of the person who is the head of the household.

16. The sixteenth of the following is the name of the person who is the head of the household.

17. The seventeenth of the following is the name of the person who is the head of the household.

18. The eighteenth of the following is the name of the person who is the head of the household.

19. The nineteenth of the following is the name of the person who is the head of the household.

20. The twentieth of the following is the name of the person who is the head of the household.

$\frac{730-728}{2} = 1$

150

$\frac{720}{2} = 360$

4.6

333

59

36

88

UNITED STATES DEPARTMENT OF AGRICULTURE

WASHINGTON, D. C.

1914

1914

1914

1914

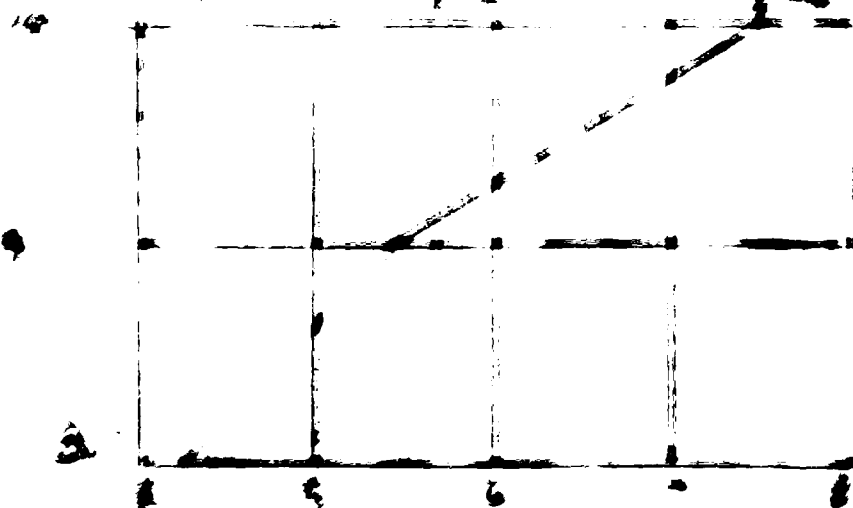
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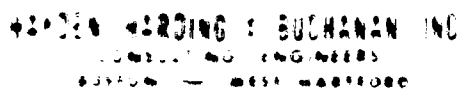
1914

HR

1944-1945

1944-1945

1944-1945



SHEET NO D 19

JOB 100
SUBJECT 100
CLIENT 100

SHEET NO. D20

JOB San

SUBJECT P.I.

CLIENT COTE

Q: 4249

5A-41-11

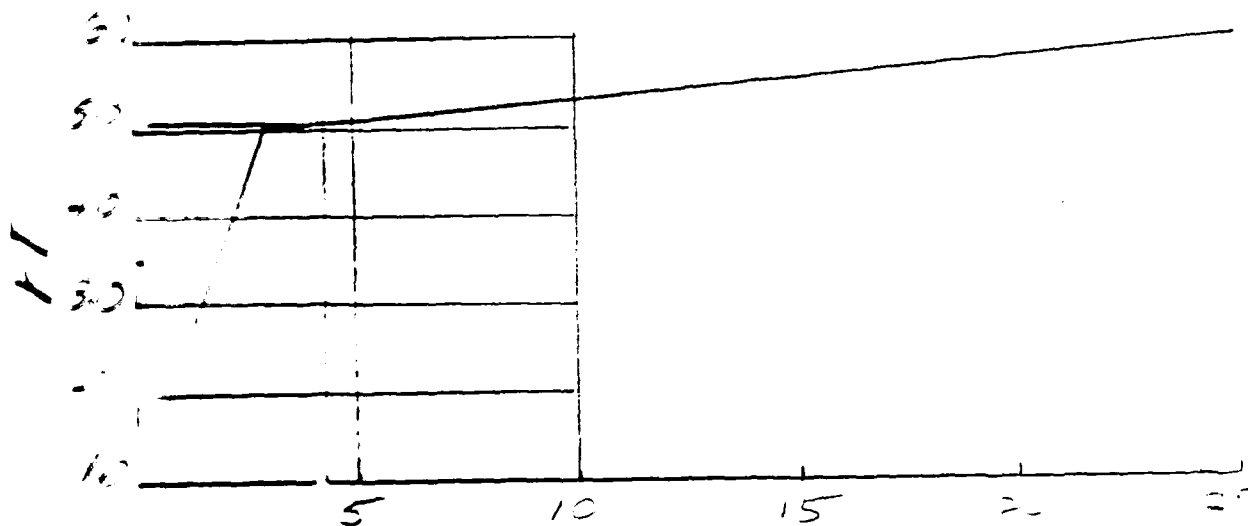
$$s = \frac{845 - 675}{2} = 150 \text{ s}^2 = 1.261$$

$$= 6.46 \times 10^{-13} \text{ } \checkmark \text{ } 5 \text{ } \checkmark$$

W P A $R^{2/3} \times 6.46$ ✓

5 10 250 1.85 11.95 2,913

750 1700 1.73 11.8 19000.



$G \times_{\Gamma} \text{pt}$

$$f_1 = 4249 \quad d_1 = 5.1 \quad \Rightarrow \dots = \frac{34.5 - 2.35}{2.35} \cdot \frac{2.35}{1.1} = 12.1$$

$$\tau_p = -4.49 \left(1 - \frac{18.1}{1090}\right) = 4.179$$

$$d_2 = 5.0$$

$$\therefore \hat{\sigma}_{p3} = 4,179 \text{ cm} = 17 \text{ in}$$

El. = 55-56. 2.

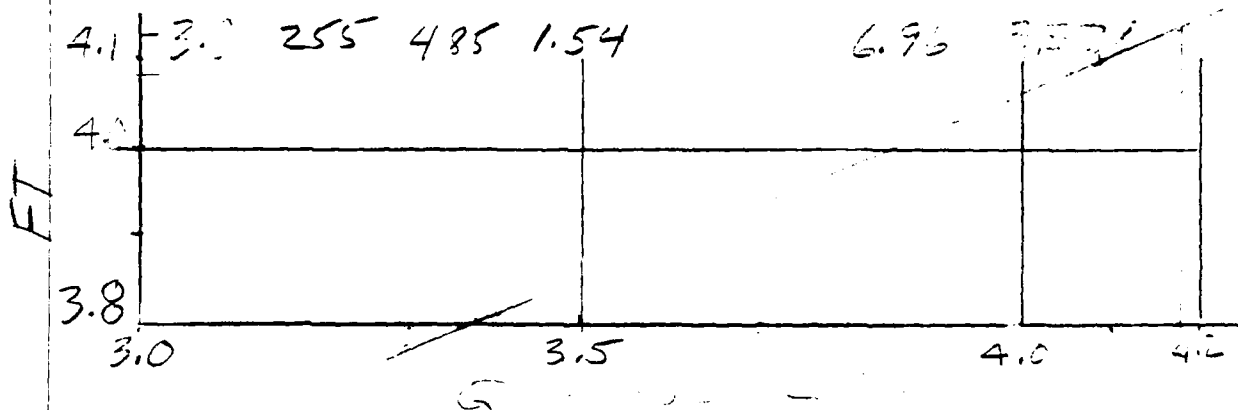
JOB NO. 79206.1001
 DATE 8-81
 BY WF
 CH'D BY JF

HH & B HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO. 021
 JOB Dams
 SUBJECT P.I.
 CLIENT CQE

Sta 70+00 $Q = 4,179$
 $S = \frac{675 - 575}{3.00} = .0333$ $d_1 = 4.13$
 $V = 24.77 (.183) R^{2/3} = 4.53$ $R^{2/3}$

| D | WP | A | $R^{2/3}$ | $\times 4.53$ | | |
|-----|-----|-----|-----------|---------------|------|-------|
| 4.1 | 275 | 560 | 1.61 | | 7.3 | 4,175 |
| 4 | 265 | 530 | 1.59 | | 7.21 | 3,120 |



$Q_{p1} = 4,179$ $d_1 = 4.13$ $= \frac{575 - 475}{3.00} = 33.3$

$Q_{p2} = 4,179$ $(1 - \frac{33.23}{1096}) = 4,052$

$d_2 = 4.08$ $ST = \frac{554.1345}{100} = 5.54$

$Q_{p3} = 4,179$ $(1 - \frac{32.95}{1096}) = 4,057$ $1.3 = 32.95$

$E1 = 575 + 4.1 = 579.1$

JOB NO. 79-206.1001
 DATE 8/11/81
 BY WF
 CH'D BY JF



HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO. 022
 JOB Dams
 SUBJECT P.I.
 CLIENT COE

Major Dam Section

| <i>Station</i> | <i>Top of Dam
Elev.</i> | <i>End of Dam
Flow Elev.</i> |
|----------------|-----------------------------|----------------------------------|
| 3+00 | 970 | 983.6 |
| 10+00 | 966 | 976.9 |
| 30+00 | 875 | 883.1 |
| 80+00 | 570 | 576.0 |
| 100+00 | 514 | 513.6 |
| 120+00 | 479 | 483.7 |
| 156+50 | 432 | 440.6 |
| 162+00 | 422 | 429.0 |

Dike Section

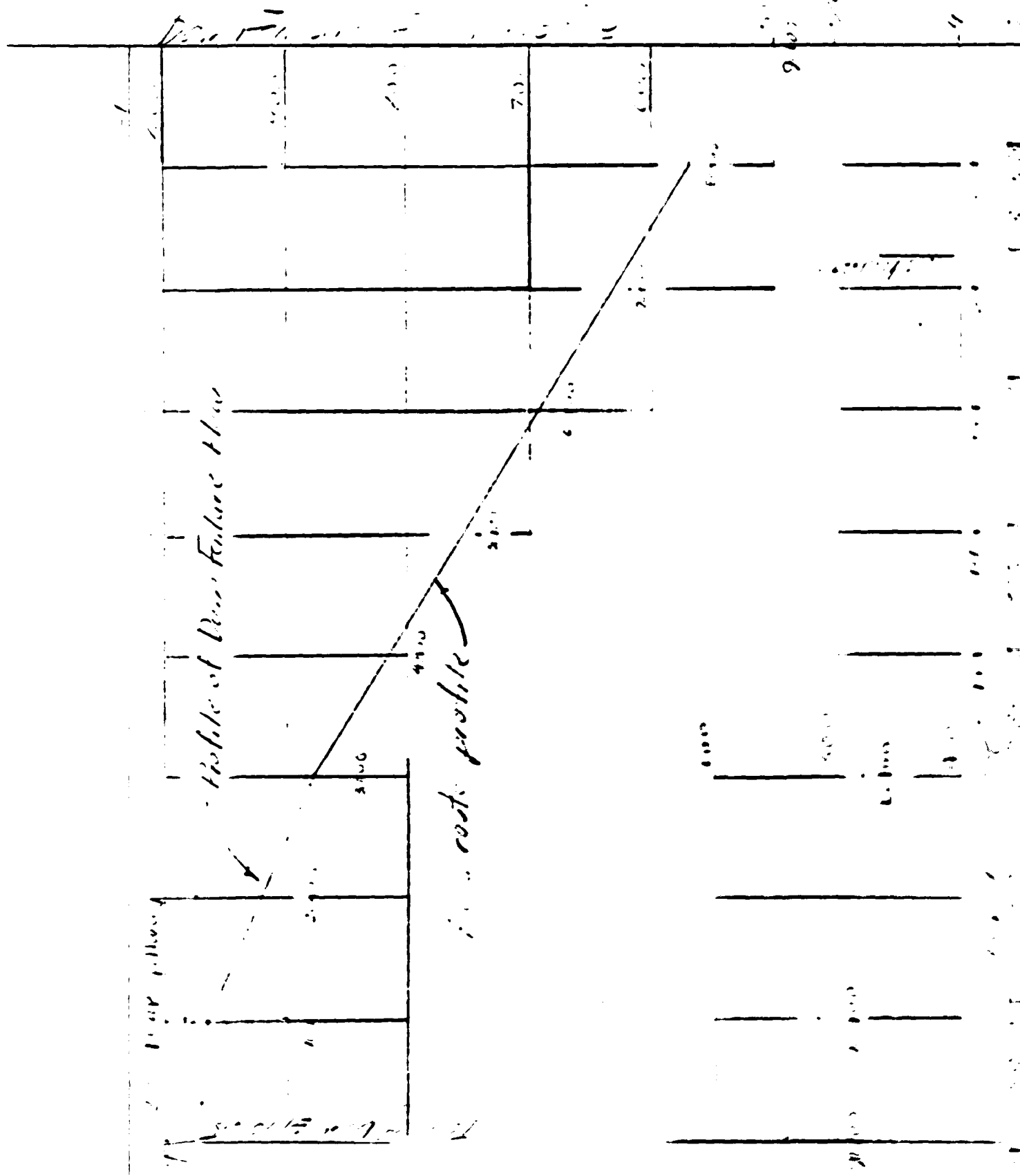
| | | |
|-------|-----|-------|
| 3+00 | 980 | 980.5 |
| 15+00 | 845 | 850.3 |
| 40+00 | 675 | 680.0 |
| 70+00 | 575 | 579.1 |

JOB NO 71206.1
 DATE 7/14/12
 BY JP
 CHD BY JP



HAYDEN, HARDING & BUCHANAN INC
 CONSULTING ENGINEERS
 BOSTON — WEST HARTFORD

SHEET NO 23
 JOB _____
 SUBJECT _____
 CLIENT _____



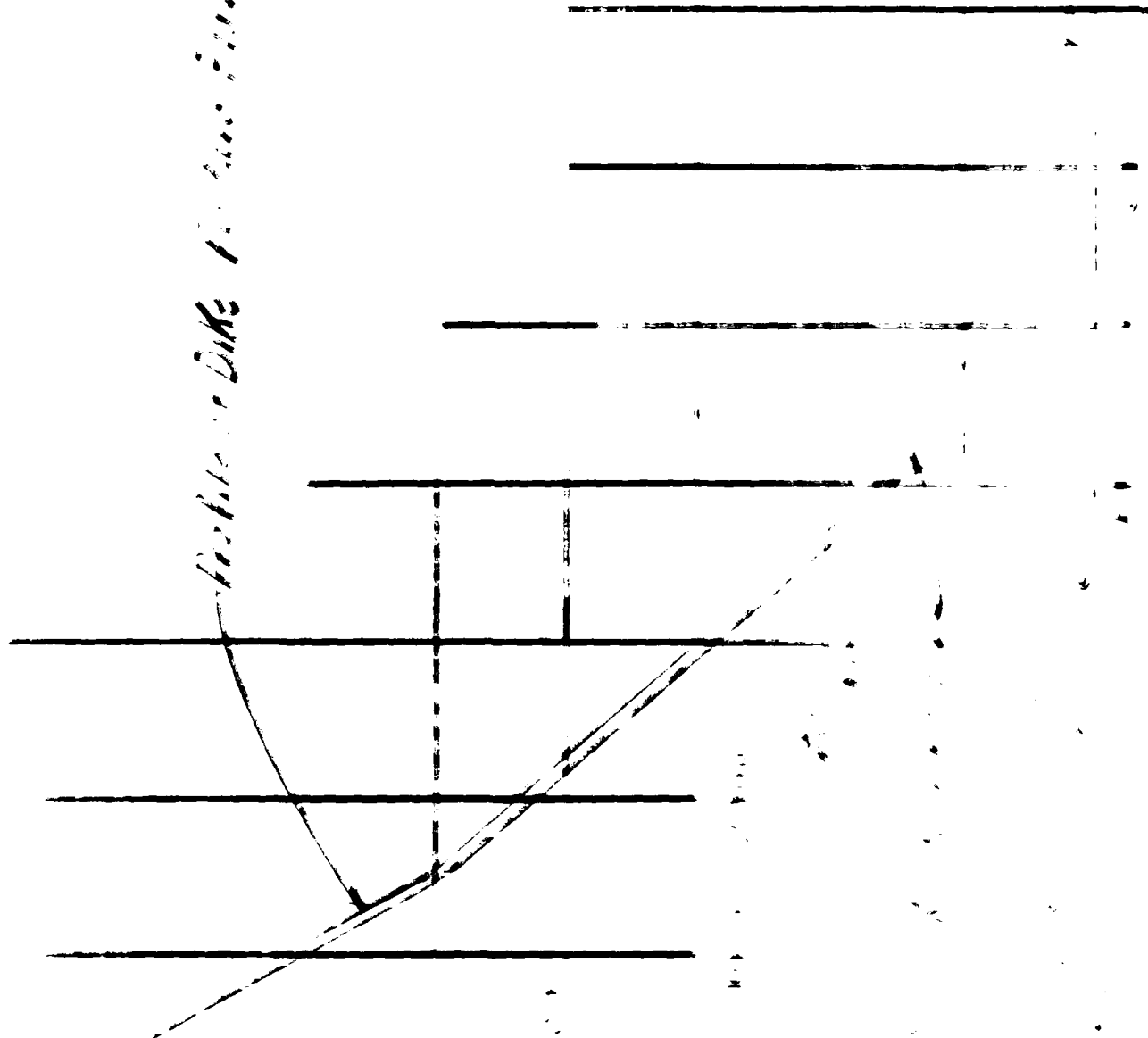
NO. _____
DATE _____
BY _____
CHK BY _____

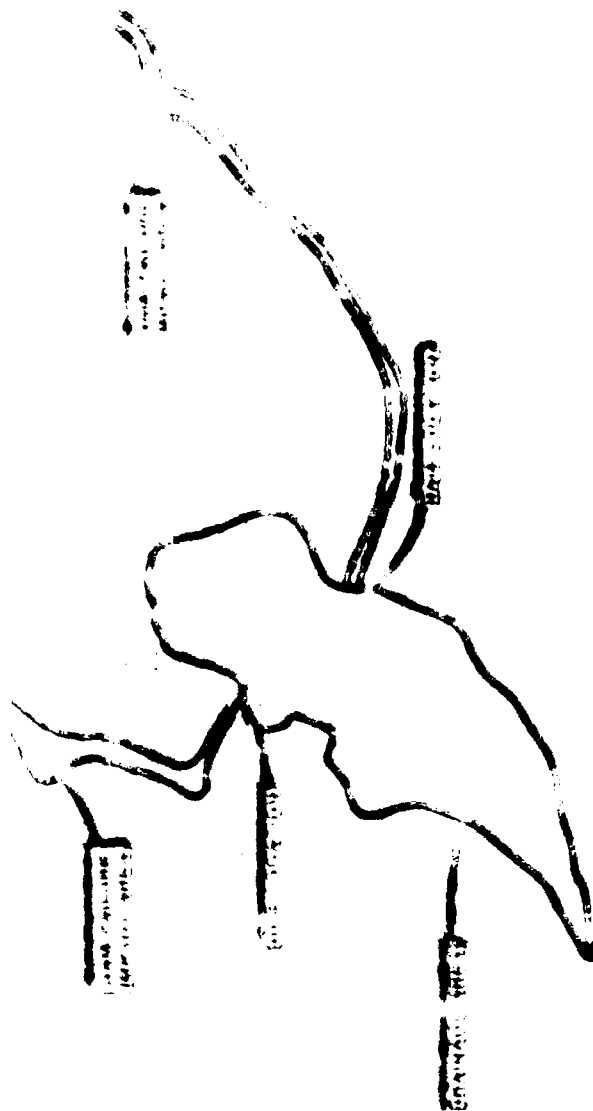


HAYDEN HARDING & BUCHANAN INC
CONSULTING ENGINEERS
BOSTON - NEW HAVEN - NEW YORK

SHEET NO. 524
JOB _____
SUBJECT _____
CLIENT _____

Rebate on Duke 100000000





APPENDIX 1

**REPORTED TO CONTAINERS IN THE
NATIONAL ARCHIVES OF 1948**

[illegible]

END

FILMED

8-85

DTIC